

THE HUNGARIAN COUNTER-IMPROVISED EXPLOSIVE DEVICE (C-IED)
STRATEGY: CONSIDERING THE USE OF MILITARY WORKING DOGS

A thesis presented to the Faculty of the U.S. Army
Command and General Staff College in partial
fulfillment of the requirements for the
degree

MASTER OF MILITARY ART AND SCIENCE
General Studies

by

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Fort Leavenworth, Kansas
2014-02

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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing this collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden to Department of Defense, Washington Headquarters Services, Directorate for Information Operations and Reports (0704-0188), 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to any penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number. PLEASE DO NOT RETURN YOUR FORM TO THE ABOVE ADDRESS.					
1. REPORT DATE (DD-MM-YYYY) 12-12-2014		2. REPORT TYPE Master's Thesis		3. DATES COVERED (From - To) FEB 2014 – DEC 2014	
4. TITLE AND SUBTITLE The Hungarian Counter-Improvised Explosive Device (C-IED) Strategy: Considering the Use of Military Working Dogs				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Major Attila Tarjani, Hungarian Defense Forces				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Command and General Staff College ATTN: ATZL-SWD-GD Fort Leavenworth, KS 66027-2301				8. PERFORMING ORG REPORT NUMBER	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for Public Release; Distribution is Unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT The Global War on Terror has spread through the world and has coerced terrorists to improve their tactics against coalition forces. Improvised Explosive Devices have become the weapon of choice on the battlefield causing unacceptable losses. Hungary, as an active NATO member, shares in the international effort and got its first wake-up call in Iraq, when the first Hungarian soldier died in an IED attack. The question is not the necessity of a Counter Improvised Explosive strategy anymore. And while budget constraints limit innovations and developments, the soldiers' protection cannot be negotiable. The Military Working Dogs program in the United States provides the soldiers more than early warnings against the threat. They are reliable and respected partners, who do their best in the same fight. This program can provide acceptable and feasible part of the Hungarian Defense Forces Counter Improvised Explosive Devices strategy concept for a long-term period. The thesis examines the benefits, advantages and caveats of the program, and considers how an integrated a system can improve the nation's counter strategy capability.					
15. SUBJECT TERMS Hungary, Counter-IED, Military Working Dogs					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT (U)	b. ABSTRACT (U)	c. THIS PAGE (U)			19b. PHONE NUMBER (include area code)
			(U)	92	

MASTER OF MILITARY ART AND SCIENCE

THESIS APPROVAL PAGE

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

THE HUNGARIAN COUNTER-IMPROVISED EXPLOSIVE DEVICE (C-IED)
STRATEGY: CONSIDERING THE USE OF MILITARY WORKING DOGS, by Major
Attila Tarjani, Hungarian Defense Forces, 92 pages.

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ACKNOWLEDGMENTS

I would like to thank the Command and General Staff Officer College and the Hungarian Defense Forces providing opportunity to meet this program that give me specials for my profession and career. Secondly, I thank my thesis committee chair, Dr. Jack D. Kem, and the two members, Mr. Jonathan M. Williams and Mr. Eric F. McMillin for their assistance, advice and their proper language forming efforts. Special thanks for Dr. Rhoda Risner, my small group leader, for the guidance and support. Finally, thanks to my student ambassador Major Steve Santucci, U.S. Army, for his unlimited assistance during the year and in the master degree classes.

TABLE OF CONTENTS

	Page
MASTER OF MILITARY ART AND SCIENCE THESIS APPROVAL PAGE	iii
ABSTRACT.....	iv
ACKNOWLEDGMENTS	v
TABLE OF CONTENTS.....	vi
ACRONYMS	viii
ILLUSTRATIONS.....	x
CHAPTER 1 INTRODUCTION	1
Introduction.....	1
Summary	5
Primary Research Question.....	5
Secondary Research Questions	5
Definitions.....	6
Limitations	8
Delimitation	9
Assumptions.....	9
CHAPTER 2 LITERATURE REVIEW	10
Introduction.....	10
The IED challenge	11
The development directions and efforts.....	12
Hungary's current C-IED efforts	14
Military Working Dogs.....	17
Summary	20
CHAPTER 3 RESEARCH METHODOLOGY	22
Overview	22
Data Collection	23
Analysis.....	24
Summary	27

CHAPTER 4 DATA PRESENTATION AND ANALYSIS	29
Introduction.....	29
The general advantages of the MWDs	30
Superior abilities versus the human factor	32
MWD tasks and categories	33
One or more task: British Model	37
Optimal Breed and selection	38
Selection Process	42
Limits and considerations overview	43
Considerations- Equipment.....	47
Limits- Medical and mental considerations	48
Limits- Religious and Cultural Considerations.....	51
Military Working Dogs as a Component of an Overall Counter IED Approach.....	52
Mine Dog and the resulting problem	57
Current developments other possible solutions	58
DOTML-PF.....	62
Doctrine.....	62
Organization.....	64
Training	66
Materiel.....	67
Leadership and education.....	68
Personnel.....	69
Facilities	70
Conclusion	71
CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS	73
Introduction.....	73
Summary of Interpretation of Findings.....	74
Recommendations for the Hungarian Defense Forces.....	76
Recommendations for Future Research	78
Conclusion	78
REFERENCE LIST	79

ACRONYMS

ACT	Allied Command Transformation
AO	Area of Responsibility
CARL	Combined Arms Research Library
C-IED	Counter Improvised Explosive Device
DoD	Department of Defense
DOTML-PF	Doctrine, Organization, Training, Material, Leadership and Education, Personnel and Facilities
ECM	Electronic Counter Measures
EFP	Explosively formed projectile
EIC	Exercise Intolerance and Collapse
EOD	Explosive Ordnance Disposal
GPS	Global Positioning System
HDF	Hungarian Defense Forces
HME	Home Made Explosive
IED	Improvised Explosive Device
IO	Information Operation
IVMMD	Interim Vehicle-Mounted Mine Detector
JIEDDO	Joint Improvised Explosive Devices Defeat Organization
MWD	Military Working Dog
NATO	North Atlantic Treaty Organization
RCIED	Radio-Controlled Improvised Explosive Device
RCP	Road Clearance Patrol
SVBIED	Suicide Vehicle-borne Improvised Explosive Device

TTPs	Tactics, Techniques and Procedures
UAV	Unmanned Aerial Vehicle
USMC	United States Marine Corps
UXO	Unexploded Ordnance
WIT	Weapon Intelligence Team

ILLUSTRATIONS

	Page
Figure 1. IED components.....	12
Figure 2. The five tenets of the IED defeat	13
Figure 3. Three main effort of the C-IED.....	15
Figure 4. DOTMIL-PF conclusion.....	27
Figure 5. Analysis method.....	28
Figure 6. Tactical Draft	64
Figure 7. Brigade MWD Teams	66

CHAPTER 1

INTRODUCTION

Introduction

The development of the Improvised Explosive Device (IED) as the weapon of choice has changed modern warfare. Using simple construction and an easy widespread and tactical application, this weapon systems' lethality demonstrates the necessity of counter IED (C-IED) measures. The impact of the weapon's application not only results in casualties, but also damages the morale of the Coalition Forces, and hinders their ability to provide a safe and secure environment. In accordance with these impacts, civilian society loses trust if the coalition troops are not able to provide freedom of movement, and a safe environment. These factors together require the consideration of the combat commanders.

Reviewing the last decade of operations, we can acknowledge that protection has become one of the major players within the warfighting functions. The reason largely stems from the Improvised Explosive Devices attacks against friendly forces or civilians. In Iraq and later in Afghanistan, IEDs have caused the most casualties for Coalition Forces (iCasualties.org 2009). Even though the innovative counter IED (C-IED) measures are continually developing and the incidents of successful IED attacks against the coalition forces are decreasing, this threat is still dominant in asymmetrical warfare. We also cannot ignore the fact that the device application is increasing against easier targets such as civilian. Asymmetric warfare and hybrid threats engage not only the countries which take part multinational operations but also remain a consideration for the

future of globalization, as they are a weapon of choice for those attempting to undermine the rule of law.

Hungary joined NATO in 1999. As an active member, Hungary is committed to taking part in international operations and doing its share in multinational operations. Hungarian Defense Forces met shock of hybrid threats in Iraq when we lost our first soldier in an IED attack. This issue continued in Afghanistan when two Explosive Ordnance Disposal (EOD) soldiers were killed while they tried to defuse an IED. Insurgents used combined IED ambushes against the Hungarian forces several other times, killing two soldiers and injuring a dozen (Bokros 2012, 1). Our Counter IED (C-IED) strategy focused on the use of jammer systems that could block the radio controlled IED signals and on good intelligence information analysis. In addition, our units received appropriate training on how to mitigate and react to the threat. However, we were lacking on effective IED device detection system. In accordance with the accepted C-IED strategy concepts, we must defeat the devices. Without capabilities or tools, though, it was impossible. This new asymmetric warfare combined with hybrid threats continues to pose a challenge for the Hungarian Defense Forces.

C-IED measures and efforts are not only in Hungarian national interests but priority tasks in NATO. Given the last decade's experiences, allied forces continue to face the hybrid threats. As a first step of counter measures, training and education provide relevant preparation for the forces before they deploy. Allied Command Transformation (ACT) is responsible for the planning and delivery of these education and training programs. The Hungarian Defense Forces are an active participant in the program, and provide facilities for international C-IED training in Szentendre City, Hungary.

C - IED strategy provides three basic guidelines for how to fight these threats. These are to attack the network, defeat the device, and train the forces (Barbero 2012, 8). The principles of the U.S. JIEDDO (Joint Improvised Explosive Device Defeat Organization) also show the commitment to defeat the device, defend or protect the troops and mitigate any strategic impact. This organization's main task is to lead, support and control U.S. efforts and developments against IEDs all around the world. Counter-measure innovation must overtake the IED makers' and users' efforts and must provide protection and survivability for our troops. Unfortunately, the internet, as an open source, helps insurgents and terrorist organizations share information and experiences worldwide to improve their tactics and effectiveness. The various allied governments, military advisors, and commanders must focus on future development of cost effective measures that can provide the desired solutions based on the lessons learned of the last two decades.

My thesis' main purpose is not to make a new strategic concept, but rather to explore how we can adapt C-IED efforts in accordance with the budget constraints, and how we can synchronize them to provide the successful cooperation in multinational tasks. My research examines Hungarian Defense Forces (HDF) capabilities, as they relate to hybrid threats, more specifically Counter Improvised Explosive Devices strategy. While taking into consideration the shrinking budget, expanding the use of military dogs as an early detection system in the field can be a low-cost, but long-term core component of the HDF C-IED strategy. The research includes how these dogs should be integrated into the fighting units or tactical organizations. As in every situation, limitations and possible national caveats will appear, but I believe this strategic concept will assist the

HDF units and commanders in the mitigation of risk and in the defeat of the IED threat in future NATO deployments. To understand the environment and make an assumption, I examine other countries' current strategies to compare or contrast them with Hungarian capabilities and efforts. Wherever the HDF will be deployed in the future, we must be concerned with the most effective and most dangerous hybrid threats weapons in use. We must prepare and develop our forces and capabilities in response to these threats. In accordance with the concerns, the solution must provide feasible, acceptable, and suitable ways for shaping the future HDF C-IED strategy, and using Hungarian military dogs will support this strategy by mitigating the risks and the losses.

The thesis is limited, because the C-IED strategy is a current and dynamic topic and much information is restricted or classified. The limited open sources and the limited communication channels with the Hungarian Defense Force units, result in more assumptions, and slow down or restrain the research method. This thesis will rely on lesson learned documents from the last decades to support and validate my assumptions if other acceptable sources are not available. Also, if information or military dog training and employment is restricted on military C-IED efforts, I will use the Police K-9 unit experiences and concepts in bomb detection tasks and extrapolate to military applications. My assumption is that the military dog concept will be able to provide an acceptable, low-cost component of the Hungarian C-IED strategy. This investment includes time to train and prepare the dogs but eventually it can become a long-term and sustainable capability. Dog teams integrated with fighting units can provide a key and versatile capability in detect and defeating these devices, thus reducing casualties and risks to the mission.

Summary

Each country needs to have a C-IED strategy for force protection on the battlefield, and in other international operations. The available resources contribute to differences between the approaches. The development of technological counter-measures requires millions of dollars and much time, but it does not guarantee success. The C-IED strategy is complex with many tasks and each task is important. Lacking expensive technical developments, other alternative measures can increase troop survivability. One of the alternative solutions, employment of military working dogs, can provide desired results. Dogs can provide early warning of IEDs, and soldiers have much more personal investment and trust in the dogs during the tasks, than in high tech devices.

The following chapter is a review of the open source and published materials that first depict the IED innovation, understanding IED innovation is important to best understanding how to develop and employ counter-measures. It provides an overview of the current C-IED strategy, Military Working Dogs documents, doctrinal tactics and techniques from and other FMs, published materials.

Primary Research Question

Should the HDF prepare their own counter IED strategy and capability with heavy reliance on military working dogs for effective participation in the future NATO operations while constrained by reduced budget?

Secondary Research Questions

1. Can improving the early device detection capability on tactical level with using dogs be the main component of the HDFs' C-IED strategy?

2. Will military working dogs provide a long-term and cost-effective solution to protect our troops in the possible future Hungarian Area of Operation (AOR)?
3. What are the limitations of using dogs that would cause national caveats or tactical/operational barriers in multinational missions?
4. What assets or solutions do other nations use?
5. What other options can improve Hungarian tactical unit protection or early devices detection capabilities?

Definitions

Area of operations. (DOD) An operational area defined by the joint force commander for land and maritime forces. Areas of operations do not typically encompass the entire operational area of the joint force commander, but should be large enough for component commanders to accomplish their missions and protect their forces (Department of the Army 2004, 1-12).

Canalize. (DOD) To restrict operations to a narrow zone by use of existing or reinforcing obstacles or by fire or bombing. (Army) A tactical mission task in which the commander restricts enemy movement to a narrow zone by exploiting terrain coupled with the use of obstacles, fires, or friendly maneuver (Department of the Army 2004, 1-27).

Counter-improvised explosive device operations: The organization, integration, and synchronization of capabilities that enable offensive, defensive, stability, and support operations across all phases of operations or campaigns in order to defeat improvised explosive devices as operational and strategic weapons of influence (Joint Chiefs of Staff 2012, GL-5).

Explosive ordnance disposal. (DOD, NATO) The detection, identification, on-site evaluation, rendering safe, recovery, and final disposal of unexploded explosive ordnance. It may also include explosive ordnance which has become hazardous by damage or deterioration (Department of the Army 2004, 1-76).

Hip Dysplasia: A condition that begins in dogs as they grow and results in instability or a loose fit (laxity) of the hip joint. The hip joint laxity is responsible for potential clinical signs (symptoms) of hip pain and limb dysfunction and progressive joint changes. The hip joint is a ball and socket joint and abnormal movement of the femoral head (ball) deforms the acetabulum (socket). The long-term response to this joint laxity is the progressive loss of cartilage, the development of scar tissue around the joint, and the formation of osteophytes (bone spurs) around the ball and socket (American College of Veterinary Surgeons 2014).

Hybrid threat: The diverse and dynamic combination of regular forces, irregular forces, terrorist forces, and/or criminal elements unified to achieve mutually benefitting effects (Department of the Army 2012, 63).

Improvised Explosive Devices (IED): A device placed or fabricated in an improvised manner incorporating destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and designed to destroy, incapacitate, harass, or distract. It may incorporate military stores, but is normally devised from nonmilitary components (About.com 2014).

Jammer: (DOD, NATO) An intercept receiver and jamming transmitter system which searches for and jams signals automatically which have specific radiation characteristics (Free Dictionary 2014).

Military Working Dog (MWD): MWDs are required by the using DOD component for a specific purpose, mission, or combat capability. MWDs are trained to perform the following functions; patrol, patrol and narcotic/contraband, and patrol and explosive/contraband detector, mine detection, specialized search dogs and any other DOD recognized capability that is used to save lives (Department of the Army 2013, 45).

UXO: Explosive ordnance which has been primed, fused, armed, or otherwise prepared for action, and which has been fired, dropped, launched, projected, or placed in such a manner as to constitute a hazard to operations, installations, personnel, or material, and remains unexploded either by malfunction or design or for any other cause. Also called UXO (Department of the Army 2004, 1-194).

Weapons technical intelligence: A category of intelligence and processes derived from the technical and forensic collection and exploitation of improvised explosive devices, associated components, improvised weapons, and other weapon systems (Joint Chief of Staff 2012, GL-6).

Limitations

The C-IED strategy is a current and dynamic topic, and many of the sources are restricted or classified. The limited open sources and the limited communication channels with the Hungarian Defense Force units, necessitate more assumptions, and slow down or restrain the research method. This thesis will rely on lessons learned documents from the last decades to support and validate my assumptions if other acceptable sources are not available. Also, if the military dog training and applications are restricted in the C-IED efforts, I will use the Police K-9 unit's experiences and concepts in bomb detection tasks nesting them in military adaption. Because the HDF has only limited numbers of EOD

dogs, and the concept is totally new, the thesis based on assumptions, this thesis will draw heavily on lessons learned experiences and the author's own judgment.

Delimitation

My thesis focuses on the C-IED application of Military Working Dogs. However, these dogs are able to conduct multiple tasks. I will not deal with other capabilities such as counter drug or guarding activities.

Assumptions

My assumption is that the military dog concept will be able to provide an acceptable component for Hungarian C-IED strategy as a low-cost approach. This investment requires time to train and prepare the dogs, but eventually it can offer a potentially long-term approach and a sustainable deployable capability. While the MWD concept is not a "silver bullet," the supporting tactical approaches and integration of the technical components as one system can provide the desired end state. The MWD C-IED approach will improve dismounted forces' effectiveness, and through requiring doctrinal adaption for mounted support. Integrated dog at the tactical level units can early detect IED threats and can provide the means to defeat the devices and mitigate the risk of losses.

CHAPTER 2

LITERATURE REVIEW

Introduction

The following chapter provides a necessary overview of IEDs and the current counter-efforts that support understanding and visualizing the environment and the challenges. Dogs' military application has its roots in history and their role is getting important again in the C-IED fight. This chapter highlights the challenge of C-IED efforts, the importance and activities of the Military Working Dogs (MWDs) in past eras, and provides a review on current Hungarian C-IED strategy efforts.

The IED, as the device responsible for most casualties in recent operations, has different implications to military strategy thinkers. Some of them believe that this is the weapon of choice for asymmetric warfare. Another point of view is that "the IED is not the weapon, it IS the battlefield" (Gaghan 2011, 17). While the IED goes back to World War II or before, modern innovation of the device belongs to the wars in Iraq and Afghanistan. The effectiveness of these hybrid threats is based on the IED attacks' effects, and low cost to the insurgent. Terrorist and insurgent organizations have quickly integrated and adapted those lesson learned observations that they experienced in Iraq and Afghanistan against the coalition forces or local government authorities. The Madrid Train Attacks on March 11, 2004 in Spain, and London Bombings on July 7, 2005 (Department of Homeland Security 2012) highlight the fact that we already know; the IED threat is not limited to Afghanistan or Iraq anymore, and it threatens our homelands, and our citizens. Hence, the necessity for a C-IED strategy is not limited to only deployed forces; rather all countries must focus on it as a national matter. Regarding C-IED efforts

and developments, one thing is true: C-IED is expensive. However, the price cannot be an excuse for ignoring it. As an active and committed NATO member, The Hungarian Defense Forces take part in international combat deployments and peacekeeping missions. Our losses showed us that we are not exceptions in the terrorist targeting methods, and IED attacks. Our C-IED strategy needs to adapt, integrate and develop in order to effectively facilitate our participation in future multinational operations and to prevent possible attacks against our homeland. Daruka Norbert, in his PhD thesis highlighted that the HDF does not have current engineer doctrine or regulations for C-IED. What written rules the HDF has dealing with the explosive devices are out of date. HDF doctrine and organization needs to be updated to deal with the current IED threat (Daruka 2013, 7-8).

The IED challenge

IED use has increased throughout the world. Insurgents realized the IEDs easy employment, significant effects and low cost make them an ideal “fit” for asymmetrical warfare. In effect IEDs “open a new battlefield” and greatly increase the effectiveness of small insurgent elements, and provide an integrated insurgent Tactical Techniques and Procedures. While the IED is usually a simple device, the categorization of the tool is difficult. All IEDs include five main components and one optional component (figure 1). The aspects of the sub-components identify the tools’ function, mission and the designated effects. The list and the subcategories persistently expand, because the innovation of the device is led by the desired effect and the goal of making counter measures more difficultly. The persistently innovating and expanding varieties of IEDs

are challenging the counter measures effort. Technology designed to find or neutralize one kind of switch mounted on a device is usually not useful for another one and so on.

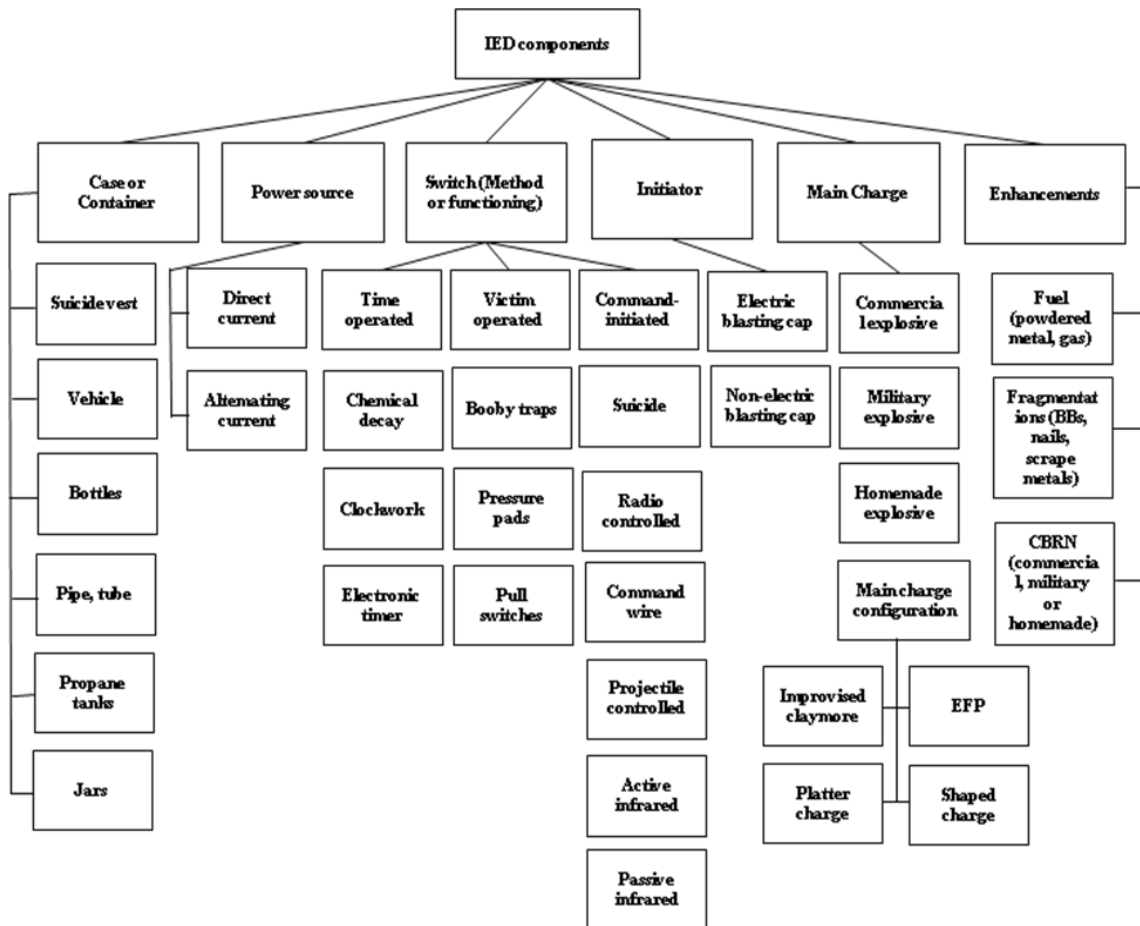


Figure 1. IED components

Source: Adrian Wilkinson, James Bevan, and Ian Biddle, “Conventional Ammunition in Surplus, Small Arms Survey” (Graduate Institute of International Studies, Geneva, 2008), 138, 141-142.

The development directions and efforts

Dealing with the IED threat, there is no a silver bullet that can give an exact, comprehensive solution to the problem, as there is no equipment or technical

development that can provide a 100 percent antidote for the problem. The focus of the technical and tactical developments is to deal with the five tenets of countering IEDs; mitigation, prediction, detection, prevention, and neutralization.




Tenets of IED defeat					
	Predict	Prevent	Detect	Neutralize	Mitigate
Attack the network					
Defeat the device					
Train the force					

Figure 2. The five tenets of the IED defeat

Source: RDML Archer M. Macy, USN, “Technology Transition for the Current War” (presentation, Naval Surface Center, October 23, 2006), accessed 21 April 2014, <http://www.dtic.mil/ndia/2006expwarfare/archer.pdf>.

Current US innovations “included systems that identify suspicious solids and liquids; new, vehicle-mounted IED detection systems; IED detection robots for combat patrols and logistics convoys; vehicle passive counter passive infrared detonation devices; vehicle, man portable and fixed site C-IED jamming systems; vehicle optics sensor systems; mechanical route-clearing devices; and funding for more combat tracker dogs” (Vane and Quantock 2011, 58). The technical developments have a shared focus. On one side are the infantry units and their troop’s protection, while on the other side are the engineer units who neutralize the device or fight the threat. A new concept is the route clearance patrol; a special engineer unit whose task is to clear the designated road from IED threat in order to provide the freedom of movement for follow on forces. Supporting their tasks, several programs and systems were developed. “One system under

development that covers a combination of doctrine, organization, training, materiel, leader development, personnel, and facilities integrations is called the Hunter-Killer vehicle (the RG-31 and the Buffalo) along with an interim vehicle-mounted mine detector (IVMMD) and supporting vehicles” (Baker and D’Aria 2005, 35). The army aviation battalion also takes part in the C-IED war, using “the MQ-1C Warrior” unmanned aerial vehicle (UAV). The extended-range multipurpose hybrid UAV had electro-optical/infrared sensors, a synthetic aperture radar, a laser rangefinder and a designator (Vane and Quantock 2011, 60). These assets provide persistent surveillance on roads to monitor and prevent the IED threat. The developments are limited only by budget and will. While these technical innovations cost billion, these assets also save lives in the fields. As always, the new technology is just a tool per se; it needs to integrate and build up the doctrine for effective application. How a force designs C-IED strategy depends on the available assets. The afford ability and sustainability factors are always dominant. This consideration supports the utility of using military working dogs.

Hungary’s current C-IED efforts

The current Hungarian C-IED concept follows the multinational partners and JIEDDO (Joint Improvised Explosive Devices Defeat Organization) guidance. The reason is simple: those organizations were founded to fight the IED in the full spectrum of conflict, and “aggressively seek to maintain the research and development advantages needed to neutralize the IED threat” (Barbero 2012, 11). The three main lines of operation (attack the network, defeat the device, and train the forces) are the ways that provide the organizing construct and focus of effort for this strategic plan.

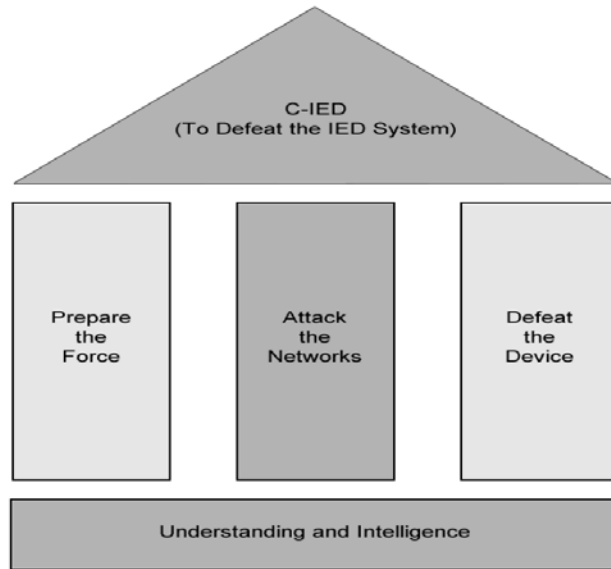


Figure 3. Three main effort of the C-IED

Source: Joint IED Defeat Organization, “Three main effort of the C-IED fight,” accessed 25 May 2014, <https://www.jieddo.mil/index.aspx>.

In Hungary, the “attack the network” operations and efforts belong to the national defense agency or special military intelligence offices. These efforts are based on sharing information and international cooperation for an effective application. Because the current IED fights are limited to the joint operational area, the intelligence network and the assets are integrated at the military joint level. Regarding training as the third line of operation, Hungary has already organized and conducted C-IED training in Szentendre City under NATO Allied Command Transformation (ACT) authority and control. The main and most expensive part of the C-IED strategy is the “defeat the device” effort. All technical innovations for increasing protection or for early detection belong to this category. Given budget constraints, Hungary cannot develop many sophisticated

technical systems, or produce new armored vehicles. The available funding is diminishing for equipping HDF Explosive Devices Ordinance (EOD) units.

Hungarian EOD is an excellent and experienced unit. The World War II legacy is the multitudes of unexploded aerial bombs, other unexploded ordnances (UXO), mines and other deadly explosives in Budapest and other cities. When a new building project starts, or simply some basic maintenance occurs on house basements, some of these UXOs will usually show up. The EOD team works on 24 hour readiness for seven days per week in order to react and neutralize those threats. In accordance with this activity, the technical developments for the C-IED battle can also support their basic duty also. It makes dealing with constraints budget a little bit easier for them. Current EOD capability development includes five categories. These are the personal protective equipment, reconnaissance and early warning detection equipment, neutralization equipment, equipment that mitigates the explosion effect or improves protection and, last but not least, the data recording systems to analyze the attacks (Daruka 2013, 143). Effective EOD teams improve only two tenets of the five, so the fighting unit capability developments must not be ignored. Hungary and the other NATO countries continue to seek solutions for developing C-IED capabilities. The shared effort and costs can facilitate acceptable solution for everyone. This concept nests the “NATO smart defense” policy, and the aegis of the shared vision and shared capabilities can guide possible ways. The co-developments and the role-and task sharing have already seen some progress on this topic (Csiki, Nemeth, and Talas 2012, 2). The HDF is considering buying some armored vehicles and high speed technologies from other countries, but it always anticipates some sensitive problems about sustainment and resupply.

In multinational operational environments, we rent vehicles that provide the necessary protection against the threat. The Hungarian Defense Forces' main infantry vehicles are the BTR-80 and the BTR-80/A. The HDF is exploring developments in C2 systems for these vehicles; but the basic design of the vehicle does not allow for improvement to its armor and protection. The vehicle engine cannot deal with increased weight, and there is no place for possible improved bottom armor. However, as mentioned before, the development efforts must seek a solution that can improve our C-IED strategy capability, and can provide a long term, cost effective solution that is not limited only to joint participation in foreign operations, but can provide support for home defense also. Early detection is a cheaper and longer term innovation solution than protection capability. For example, the MRAP (Mine Resisted Ambush Protected Vehicle) developed for protection against the IED threat has limited application in conventional warfare. Training military working dogs can provide a cost effective approach, can improve the early detection capability, and could be the main and the first step in defeating the device. If our soldiers can recognize and acquire the threat, the EOD sections can neutralize it, reduce or eliminate the losses.

Military Working Dogs

Interaction between humans and dogs goes back to ancient times, but the military working dog application began in World War I. All through time, man was seeking the opportunity to improve effectiveness in warfare by increasing the killing rate or bridging some existing gap by using animals. Although several species have been used throughout history, only the dog has survived the tactical and strategic developments until today. The reason is that the dog is the only animal that possesses intelligence and commitment for

serving the handler not only because he trained for it, but he wants to. World War I was a revolution in warfare. The new weapons technologies and the mass armies overthrew the previous concept of the decisive battle; the resource requirements led nations to total war. The endless bloodshed forced the leaders to seek a solution to trench warfare and a way to exhaust their opponent forces. The deadlock of trench warfare caused many problems. The radio did not exist, and wire communication lines were disrupted or simply did not work well. The persistent artillery fires left the terrain covered by mud not only in the “no man’s land” but also in the trenches. The unburied dead bodies and the countless injuries mixed with the muddy environment and provided optimal condition for rats and diseases. And as a culmination of the problems, poison gas as a new weapon persistently threatened the soldiers.

All those gaps and problems provided the “raison d’être” for dogs. The primary and most common task was the messenger mission providing vital communication between the posts and trenches. The messenger dog moved three times faster than man in any weather or visibility condition and provided a smaller target for the enemy. The dogs were not slowed down wearing heavy equipment, and easily breached the wire and other obstacles (Cooper 1983, 58). There are many war stories about canine heroes that carried messages for long periods with several injuries. The other effort was the fight against the rodents and rats. The small size breeds successfully controlled the rodent population.

Beside the messenger dogs, the other main concept was the Red Cross dog. The deadlock of the trench warfare, and the persistent effort to push the lines and keep advancing caused uncountable injuries in the area called no man’s land. Machine guns, and protected observers ready to call artillery strikes on no man’s land, fired on anything

or everything that moved around, even the medical staff. These dogs were trained to ignore the dead soldiers, and focus only on the injured ones. The dog's basic equipment included medical supplies, small canteens of water and spirits hanging on the dog's chest that the wounded soldier could use to treat his wounds. Often the wounded dying soldiers held the dogs and the dogs providing company to them as they passed away. If the dog found a soldier who could not move or was unconscious, the dog returned to the handler providing this information. The methods were various; some of them trained to bring the wounded soldiers' helmet or some equipment from his clothes, while others were trained to hold the short leash in the mouth for a similar signal (Lemish 1996, 12-13).

The other possible application of dogs is shown in various pictures of the nations in the World War I period. In Belgium, the dogs trained to pull machine guns and others were trained for carrying things. The average dog can carry 80 pounds. Different harnesses were set up to take advantage of this, carrying everything from ammo to telephone cables (Cooper 1983, 62-63). Sentry dogs were not as prevalent as the others, but were undoubtedly important as well. To achieve success, sometimes the opponents dug under the trenches and blew them up, or launched a poisoned gas attack on unsuspecting soldiers. In both situations, the sentry dog provided early warning for the incoming threat mitigating the effectiveness of the opponent forces' effort.

After World War I, all these tasks seemed needless. Technological development and improved tactics solved the deadlock-trench warfare. The mechanical age ignored dogs' abilities. In the interwar period, only a few nations maintained the concepts and trained dogs for various tasks. When World War II started, the "ghost of the system" concept quickly showed up. In several situations, the radios broke, the communication

lines were covered by heavy fires and ammunition supply blocked (Cooper 1983, 64). All those issues highlighted the experience of the previous war, and most nations restarted the military working dog training. In the World War II period, the dogs were used for guarding, sentry, and patrol tasks. Those tasks are still the main concepts of the Military Working Dogs for today along with the mine dog. The need for detecting the mine threat by sniffing was a role born during World War II. The military innovators realized that the dog was much more effective against buried mines than metal detectors (Cooper 1983, 69). These concepts produced success through several other wars, and set up the fundamentals for the modern MWD explosive search programs.

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Summary

“Change is an ongoing project that has no end: each battle fought relinquishes lessons learned and a better approach for the next battle” (Baker and D’Aria 2005, 35). Most would agree about that there is no silver bullet against the IED threat. We cannot say that within the five IED tenets of mitigation, prediction, detection, prevention, and neutralization one is more important than the other. But given the budget and financial constraints, we must seek the most sustainable and low cost solution that can provide an acceptable solution for the field application. Most of the sources reviewed mention the advantages of military working dogs, and most of them agree that dogs are much more

reliable than other technologies, based on soldiers' belief and trust in the animal. This solution improves the prediction and the detection capability; they are faithful partners of soldiers; that is what makes them so important in the IED battle.

CHAPTER 3

RESEARCH METHODOLOGY

Overview

This chapter describes the research and logical analysis method in order to answer the primary research question and to facilitate the analysis in the following chapter. The previous chapter described the challenges and threats, and provided an historical overview about the MWD application in the military revolution of the mechanized age. In order to answer the primary and the secondary questions of the study, a clear understanding and comprehensive knowledge about MWDs are required. The chapter helps to understand how the study goes about the information collection and analysis process providing indirect answers.

The research focuses on the Hungarian Defense Forces (HDF) Counter-Improvised Explosive Devices (C-IED) Strategy, particularly future developments in order to participate in international operations and improve Hungarian home defense capability. Regarding budget constraints, the possible ways and means are limited, but the HDF cannot ignore the IED portion of the hybrid threat. However, while the C-IED is a hot topic in all NATO countries, and current efforts already prepare and integrate different methods and assets, the possible sustainable and feasible solutions always reflect national interests. This research's main purpose is not to set up a new strategy method, but rather to focus on how to improve our capability to meet the IED challenge. In accordance with the JIEDDO (Joint Improvised Explosive Device Defeat Organization) line of operations concept, the three main ways, or lines of operations are to attack the network, defeat the device and train the force (Barbero 2012, 8). The

primary research deals with this line of operation concept and focuses on the possible HDF C-IED strategy in order to effectively participate in the future NATO operations. This research explores the use of military working dogs as an early detection system in the field as both a low-cost and long-term HDF C-IED approach. The thesis also examines whether MWDs will be interoperable and acceptable as a center of the C-IED strategy if the HDF adopts dogs as the primary C-IED approach. The research examines on the limitation of using dogs in case that would violate national caveats or tactical/operational barriers in joint multinational missions. To research the problem from different aspects, it will need to explore the other possible assets or systems that other nations use in current operations, and set up other options that can improve the Hungarian tactical units' protection or early device detection capabilities.

Data Collection

IED are a dynamic topic. This research is limited to open sources only. The preferred information collection method will be a parallel one. First, available information is collected from US sources using the Combined Arms Research Library (CARL) facilities, followed by gathering information about the IED history and application methods. The current doctrine provides information about counter measures and how the US Army builds its own C-IED capabilities nesting the JIEDDO fundamentals. The data collection includes the Iraq and Afghanistan lessons learned experiences. The research will focus on internet published sources and articles for technical developments, and collects the information about the developments in the IED challenges. K-9 units and military working dog applications are not new methods; Using CARL archives and DOTML-PF (Defense Acquisition University 2005) to collect US

doctrine as well as previous MMAS and Naval college works about the military working dog experiences, training methods, and limitations, this thesis will examine existing best practices and techniques.

The second information collection focus is on Hungarian sources. Due to the lack of the Hungarian C-IED strategy documents, I will continue to collect data and information from the Hungarian Explosive Ordnance Disposal (EOD) unit. It includes the current technical assets, capabilities and the possible developments also. The HDF EOD unit uses military working dogs for a limited purpose; the research collects the available doctrines and documents from the preparation and the application phases. Using the Internet, the author will glean any information from Hungarian civilian dog training sites about the training costs and approved training plans or methods. The research collects the Hungarian strategic publications from the internet that includes the NATO and national defense guidelines and future efforts.

Analysis

In order to find answers, the study uses a qualitative methodology for the analysis. The study seeks to research and analyze my problem statement and the possible solutions from a different perspective based on assumptions and the current available knowledge about the topics. Qualitative research focuses on the why and how aspects of the data and information. In order to lead the available sources through the assumptions and nest them into the author's mission experiences to identify the end product. To support the information analysis the study uses Herbert E. Meyer's seven step information analysis model. In Meyer's book, *How to Analyze Information; A Step-by-Step Guide to Life's*

Most Vital Skill, he identifies and explains the necessary steps to take, as follows (Meyer 2010, 2-10):

1. Figure Out Where You Are. You cannot make sense of information unless you know where you are when you look at it. The primary assumption about the concept based on the history is already described in the chapter two. The personal experiences and the obvious necessity of the C-IED development set up the requirement for the HDF. Even the C-IED strategy, the main focus, is based on a vital and acceptable tactical concept. The lesson learned experiences from the World War I and II already demonstrated the effectiveness of military working dogs. The available sources and lessons learned experiences provide a fundamental way of thinking about how the dogs can adapt in accordance with the modern threats and challenges.

2. Be Sure You're Seeing Clearly. It's obvious that seeing clearly is important. But when you're dealing with information, "clearly" has a special meaning that isn't so obvious. The C-IED fight cannot be won with one silver bullet or one perfect solution. Even in the desired end state of the development of the MWDs, the integration, synchronizing and adaption with other systems or tools is obviously required. The results that dogs show in the past will not guarantee success in the future, but set up assumptions to achieve the solutions, one step further than where the HDF is standing now.

3. Decide What You Need to Decide. "The question is more important than the answer." The research tries to focus not directly solving one key or main problem, rather tries to provide a tactical process that mitigates the IED effects on HDF troops. The tactical development adaption provides a C-IED strategy concept or effort that can be integrated in the Home Defense effort also. The problem framing from different aspects

supports the understanding that the concepts' main goal is to expand the effectiveness and the protection of HDF troops. As a side effect of the effort, the IED threat effectiveness is mitigated.

4. Determine What You Need to Know. The Military Working Dogs concept's fundamental component is the dog. It is important to understand the different breeds' advantages or disadvantages, and the limits and caveats of using Military Working Dogs.

5. Collect Your Information. The research collects every clue and information about MWD from World War I through the Afghanistan war lessons learned experiences. The advanced MWD doctrine and incident reports provide basis for analysis from different aspects. Concerning the strategic concept and tactical application, the warfighting functions provide categories to support information collection. Civilian hobby animal keeper and mascot experiences can also provide a useful point of view about some critical problems connected to the dogs' ability, behavior or sustainment.

6. Turn the Information Into Knowledge. The study will take the collected information through the analysis process, while using facts and assumptions to make some suppositions. Using that summarized information and the DOTML-PF construct, the thesis will offer some conclusions and recommendations in the chapter five.

7. Add the Final Ingredient. Before actually making your decision, there is one final ingredient you will add whether you want to or not: your own judgment. The study will examine a concept that the HDF does not have. While the MWD is not totally new in the HDF history, the current application is narrowed to a few EOD dogs only. The IED threat, and the other aspects of using MWDs in the HDF task of deployment or Home

Defense is new. The study's conclusion is based on the author's personal judgments, and assumptions. The framework below is how key findings will be categorized and captured.

<u>Military working dog in HDF C-IED strategy</u>		
	Advantages	Disadvantages
Doctrine		
Organization		
Training		
Materiel		
Leadership and education		
Personnel		
Facilities		

Figure 4. DOTMIL-PF conclusion

Source: Created by author.

Summary

This chapter describes which sources the study will use in the research method, and how it will analyze the problem statement to get an answer to the thesis. However, the C-IED strategy is a general topic currently, but from the Hungarian Defense Forces perspective, the exploratory research seeks to investigate how the adoption of military

working dogs could shape future concepts. Mr. Meyer's seven step analysis model will ensure that the study will not ignore some critical information and how guide this thesis will be able to blend my creative and critical thinking skills to get closer to the solution. I will follow the steps as illustrated below:

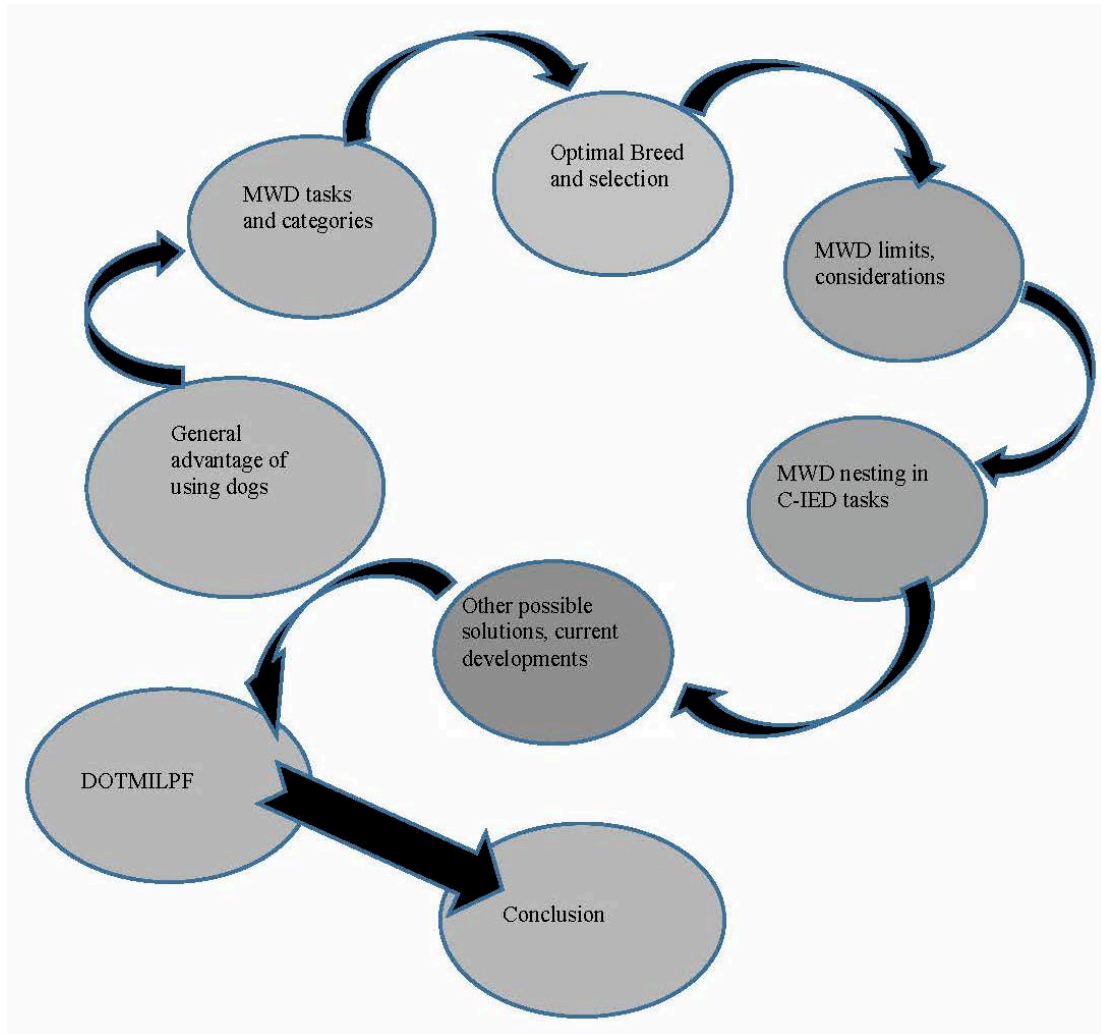


Figure 5. Analysis method

Source: Created by author.

CHAPTER 4

DATA PRESENTATION AND ANALYSIS

Introduction

This study seeks to answer the question, “Should the HDF prepare their own counter IED strategy and capability with heavy reliance on military working dogs for effective participation in the future NATO operations while constrained by reduced budget?”

The purpose of chapter four is to analyze the possible answers to the question: Can the Military Working Dogs be the main concept of the Hungarian C-IED strategy and what other assets or equipment are necessary? To find answers, one should understand what advantages the dog can add and how the concept nests for different tasks. The previous wars’ lessons learned experiences and the current MWD efforts to improve in the US DOD show and highlight the breed selections and considerations that the Hungarian Defense Force can use to avoid making unseen, unnecessary investments. The analysis helps to understand the MWD’s limits and equipment requirements, and explains how those can affect the applications and the causes of unacceptable results. Using the current C-IED lines of effort and the collected MWD capabilities, the analysis explains how the MWD can support the ground combat commander efforts on C-IED tasks. This chapter is designed to develop and understand the concept that the MWD is not a single solution for any task; rather it is a part of a complex system.

The necessity of the C-IED strategy goes back to the insurgent tactics. The insurgent forces fight as they can against the coalition forces and seek an opportunity to expand their success at all levels to gain the initiative. How does a force fight if it is

under-equipped and have inferior in manpower? You need a key solution that is easy and cheap to produce, easy to use, but can cause effects at strategically, physically, and psychologically. These reasons led to the military innovation of the IED and it has become the weapon of choice for insurgents. Using explosive devices against opponent forces in an ambush or for morale effects is not new in warfare. The simple mines in history were designed to deny access to territory or provide security for military objects, canalize troops and delay or disrupt them. Theoretically, mines are the predecessors of IEDs because they share the same tasks and purposes. All efforts against mines in previous times can be useful and can aid in the current C-IED fight. However, the first application in the Army of the MWDs does not belong to the counter-explosives fight; dogs always have taken part in the human's wars.

The general advantages of the MWDs

The main reason for using dogs in the military comes from their physical abilities and characteristics. The effectiveness of military working dogs in previous wars is subjective; we can analyze statistics and diagrams and the results remain open to debate. They generally exceed technical solutions and provide something intangible. The four-footed partners have a superior sense of smell, superior day and night vision, a superior sense of hearing, and they continually desire to serve their handlers with unquestionable loyalty.

The first superior capability is their sense of smell. The average dog has forty times better olfactory ability than humans. Odors are analyzed by our brains, using the olfactory center. The human olfactory center is about half a square inch in size; the average dog has twenty square inches (Lemish 1996, 218). The membrane is supposed to

filter the odors, and the different breeds have a different number of sensors showing they have different abilities for tasks. The German shepherd has 220,000,000 sensory cells. There is no direct connection between the dog size and the olfactory capability; Beagles are only half the size of the German shepherd but have same numbers of odor receptors (Goodavage 2012, 167).

The other vital trait is their superior sense of hearing. The dog has a special ability to distinguish sounds. They can activate seventeen muscles to focus the sounds to around 35,000 cycles per sound (Hz). They also have an inner ear helping them to distinguish the sounds, and they can focus on only the background noises. The shape of the ears is also important; the ears perk up, and the dog swivels its head looking for the source of the sound. The shape and the orientation of the ears are equal with their effectiveness. The floppy-eared dog breeds does not have as much ability (Lemish 1996, 219).

The dogs' eyes have the same construction as human eyes with some small differences. The number of the rods are higher than the cones; in a practical way it means that they do not see as well in strong light, but they have noteworthy advantages at night. There is a membranous area around their retina called the "tapetum." "This region reflects light back toward the retina after it has passed through once, effectively giving the dog two chances to capture the same image. Shine a light into a dog's eye at night, and you can see the tapetum as a yellow or blue glare. Dogs are color-blind, but they have better ability seeing a moving object at a distance than the human (Lemish 1996, 219-220).

Last, but not least, the dogs' military applications can be useful when escalation of force is necessary. The bite job requires much more aggressive attributes and a trained

attack dogs' powerful jaw muscles and sharp teeth can exert 360 pounds of pressure. That is five to six times the 45-65 pounds of pressure of a human bite (Lemish 1996, 220).

Superior abilities versus the human factor

All these superior capabilities provide advantages over the enemy or solutions for an existing problem. Nevertheless, the dogs' sustainment costs are not more than that of the average soldiers, and usually less. Military innovators usually seek technological developments and ignore the living animal's roles in the fight. However, there are always exceptions and those persons who have experience with MWDs see the challenges and the solutions differently than most. Yet persuading decision makers is still hard. The newest technological developments always seem to provide a silver bullet for an existing and painful problem or simply try to give us some advantage over the opponent's capabilities. The integration of new system requires sustainment and maintenance to ensure the maximum effectiveness for the appropriate application. The problem is that if developer show the new shiny tools to the generals or to those people who decide on the projects' future, they focus on the development and maintenance cost to ensure an acceptable price. However, success is not guaranteed. Even though military working dogs have already proved their effectiveness over several wars, their training and sustainment is considered high cost (Thornton 1990, 11).

While the face of the war is changing, there will always be a place and task for military working dogs. Their instincts and abilities can rise over machines' capabilities, and soldiers trust them much more. The dogs have the ability to smell not only the odor that they are trained for, but they can recognize on unnatural ones, see in the dark, see the long range movements, and hearing possible threats. They are mobile, easily transported,

require relatively small logistic support, and, if integrated appropriately with other systems, they are effective and reliable partners.

MWD tasks and categories

Military Working Dogs can be trained for many tasks and there are many varied approach to use them. The main threat or the most dangerous course of action of the opponent forces on a tactical level identifies the requirements or approaches that guide the preparation efforts of the dogs. Looking over the wars from World War I until the current irregular warfare connects for C-IED, military working dogs filled several roles, and mitigated or solved many problems facing military forces.

In World War I, the dogs were involved in controlling rodents in the trenches, searching injured soldiers in the no man's land, carrying messages or sentry tasks. The deadlock of trench warfare and communication problems made the military working dogs focus on initially on these problems in order to bridge to these gaps. In World War II, military working dogs performed some new tasks as military innovation changed the battlefield. Their roles still included messenger and sentry tasks the mine detection as a counter measure for this new threat become a new MWD task. During the Vietnam War, insurgent activities and ambushes against patrols and attack against military installation, highlighted the necessity for MWD task of guarding, patrolling and searching. Dog acquisition and preparation focused on providing sentry, scout, mine/tunnel and tracker dogs.

This lead to the question of what are the capabilities needed to react in the modern irregular warfare operating environment? Clearly, the roles of the military working dogs nowadays are many; they can perform in Search and Rescue missions on the battlefield or

natural disaster areas, and they are a critical member of the emergency response team. Furthermore, dogs can sniff narcotics in different conditions. My research focuses on those abilities serve as a component in the Counter-IED fights. The military working dog main activity in C-IED effort focuses on sentry, scout, tracker, mine/explosive, and search dogs.

Sentry dogs are designated for classic guarding tasks. They are aggressive and prepared for bite jobs. These dogs provide physical security and psychological deterrence against intruders around military bases or camps. Sentry dogs can free soldiers for other tasks, so they serve as economy of force asset. The problem with them that they are trained to attack everybody except their handlers for and this aggression makes them unpopular, and perhaps dangerous, around soldiers. More importantly, handler replacement is nearly impossible because of that aggression (Thornton 1990, 5).

Scout dogs work with tactical infantry units. Their task is to locate opponent forces present around or near the friendly patrol and signal enemy presence warn out ambush or attacks on friendly forces. These tasks require an excellent ability to silently detect the enemy. Friendly forces want to remain undetected to gain the initiative and prepare for counter actions. Scout dogs can also detecting tripwires or booby traps and mines, and provide an early warning by being a mobile sensor in a hostile environments. They are a useful member of reconnaissance patrols in every weather circumstance both at day and night (Thornton 1990, 14).

Tracker dogs follow human tracks and scents. This ability allows units to seize the initiative from the enemy. The psychological effect of forced being tracked or chased creates in the enemy the perception of being to retreat and of losing freedom of action.

This task requires quick deployments to area where the dog will operate so that the dog has a fresh trail to follow. Tracker dog can also serve to map enemy prepared tactical positions or temporary locations (Thornton 1990, 14).

Mine and explosive searching dogs can detect different kinds of explosive devices, even those, that are buried or covered with camouflage. They can detect plastic or non-metallic mines and trip wires as well. However, they do not offer a complete solution against the explosive devices but they seem much more effective than the normal detectors. The reason is that the sniffing job is based on the type of explosive, and not on detecting metal material (Thornton 1990, 13).

Currently, the tasks are much more specialized and the modern battlefield requirements have changed military working dogs activities more complicated. There is professional controversy concerning, how many tasks a dog can learn. By category these are single-purpose and multipurpose dogs. The single-purpose dogs serve sniffing jobs only; they do not need to be aggressive. They are trained for searching for explosives or narcotics, or sometimes humans in special search operations, but never both. The reason is that the found object requires different actions, so the handler must know what the dog is detecting. The variety of a single-purpose dog is wide and depends on the job assigned to them (Goodavage 2012, 51-52).

Explosive detector dogs are used by all branches, but the handlers are military police. The specialized searching dogs are much more specified; some explosive detector dog have specialized training to find explosives while working off leash at a distance from the handler. The combat tracker dog is a United States Marine Corps program only; these dogs can detect explosives and weapon caches and can track down the person who

hid them. The mine detection dog program trains MWDs for the Army to search mines and artillery assets. The tactical explosive detector dog is a temporary program for the Army. Contractors train the dogs for IED detection, and selected infantrymen will be trained to work with them together. IED detection dog is a similar program to the Marine Corps to counter the IED threat, and buy trained dogs for infantry handlers (Goodavage 2012, 52, 54). The Hungarian Defense Forces Explosive Ordnances Devices (EOD) Team has eighteen explosive detector dogs, fourteen in active duty, and four under training. Those dogs are the all MWD capabilities that we possess, and their task focuses on the EOD support only.

Dual purpose dogs are required to be much more aggressive than the single purpose ones. When they conduct patrols they are prepared to protect or to attack if needed; they can do detection and basic scouting work also. Basic scouting means the dog can track the human scent through the air. Usually German shepherds, Belgian Malinois or Dutch shepherds are used for dual purpose works. The three main programs of the dual purpose dogs is the Patrol explosive dog, the Patrol narcotic dog, and the Multi-purpose canines program (Goodavage 2012, 54-55).

The Patrol explosive detection dogs are the backbone of the DoD war-dog program. All branches use them; they conduct the basics of the dual purpose requirements. The Multi-purpose canines are more specified. These dogs belong to Special Operations. They do the same as the Patrol explosive detection dogs works, but they can be used in parachute or rappel operations. They are equipped with special tools and their character is extremely resilient and active (Goodavage 2012, 55).

One or more task: British Model

The policy of the military working dogs role and capability is controversial. The British Army has many experiences with dogs around the world and throughout history. Even they realized the necessity of dogs much earlier than other nations, and their experiences provide guidance for many nations. They prepare and train dogs for special regional areas such as jungle, field or urban area. The canine recruit comes from donations within the UK which is why they rarely purchase animals from rearing. MWD operations are integrated completely into the peace time training system. This provides clear situational understanding for all level commanders about the MWD tactics. The British system sees the dog application and training like a human soldier's function. The concept does not require one soldier to be good in all branches; they train them to be professional only in one, because multiple training means having some skills in every kind of task, but no real mastery in all of them. Thus, single role military working dogs are the desired in the British Army; they are trained only for one task or job (Thornton 1990, 10).

Trying to meld all skills it one, and make super dogs is not new in history. The US government used to have a vision of this, to produce super dogs combining the tracker, scout and mine/tunnel skills into one all-purpose animal. But the research was stopped in 1976 after three months of trying, because the original idea was controversial. Most dog specialists believe it does not work, and the result could be an all-skilled animal with no real practical skill.

Optimal Breed and selection

When there are tasks, we want to be sure that we have the appropriate animals to accomplish the task. An important question is, which dog breed is the perfect for the MWD services, and why. But in reality, the dog's traits' are much more important, than the breed per se. This analysis is grounded in the available data and information from the previous war lessons learned, the current battlefields experiences, and the ongoing MWD programs descriptions. The selection of the dogs' method begins with the job or the assignment type. The different tasks require different breeds and individual characteristics, and vice versa; that is why some breeds do not fit for some special tasks. But all the sources agree that there are vital qualities in all MWDs which are: courage, protective instinct, intelligence and perseverance (Goodavage 2012, 47). The dogs that are in service must be healthy, they cannot suffer from fear and distress, and they cannot be afraid of shooting.

However, while individual traits are dominant for selection, the basic abilities of the breed can provide guidance for the decision. Also, it is important to know that some jobs specially require excellent sniffing abilities and non-aggressive behaviors some special jobs ones include bite jobs and assistance in chasing bad guys. Throughout my research, I encountered three main breeds of dogs; they are the shepherds, guarding dogs and hunting dogs. These dogs possess the necessary abilities to become effective MWD.

Hunting dogs are usually excellent trackers, and they are good at the sniffing jobs, but lack of human aggressiveness. The two most common hunting dog breeds in military application are hounds and Labradors. Hounds are robust of build and superb trackers; the reason is they have three hundred million-odor receptors in their noses. They can

follow one-odor track from the origin of the source for a longer time than other breeds. They are more timid rather than aggressive (Fiorone 2000, 183). There were several tries in the past, when the Army trained them for special tracking task to take an advantage of their super sensitive noses and odor following abilities. The problem was their attitude; they usually barked during tracking and that gave away the initiative and the surprise (Lemish 1996, 207).

Similarly Labradors are excellent for sniffing out drugs or explosives; they have intelligence, but they do not have the human-aggression component (Ritland 2013, 36). They are docile, and they can tolerate the climatic differences much better than other breeds. The Labrador is one of the most popular breeds around in civilian animal keepers because of their intelligence, their nature and their persistent desire to learn. They are excellent family dogs with a maximum tolerance for children and they show non-aggressive behavior. Mostly these traits lead them to being hired in many agencies as search-and rescue or narcotic detection dogs.

The U.S. Marine Corps' preferred dog of choice is the Labrador for most of the MWD tasks within the organization. Yet they also are considering changing the breed because of some after action reviews and lesson learned experiences. Labradors are still the flagships of the Counter IED effort in the USMC. The problem they recognized stems from the Labrador is the exercise intolerance and collapse (EIC). Most of the young adult Labrador dogs collapse after five to twenty minutes of strenuous exercise. The recovery time from EIC is different within the dogs, and some of them will have residual weaknesses or health injuries connected with heat stroke (Strock 2011, 15).

Both hounds and Labradors are assigned tracker tasks, which means to follow one scent on the ground. This scent needs to be shown to the dog so that they can frame a scent picture in their mind. They can follow the odor among thousands of other odors on track. The differences between trackers and scout dogs are the scenting. Scout dogs are trained to sign any unfamiliar odor around the area, and provide early warning for the handler (Lemish 1996, 209).

The Doberman belongs to the guard dogs breed. They are medium size, strong, faithful and fearless dogs. They are well adapted to defense and guard duties. When any danger shows up, their muscular body stiffens, and gets ready for an attack on their masters' orders. Training them for the guard task is easy, because they are intelligent, obedient and have a natural aptitude for those jobs (Fiorone 2000, 92-93). The problem with the Doberman is they are highly temperamental and demonstrate nervous characteristics under field conditions. It does not mean that they are not disciplined or fail in obedience, rather in combat the handler has problems controlling and calming them down, because they want to attack the adversary and defend the handler even when they were not supposed to (Lemish 1996, 129).

Shepherds are the best field workers, and the most preferred ones. The reason is their character, courage, and faithfulness. They can be trained for various tasks; their characteristics include obedience and a full serving passion for their handlers. They can acclimatize themselves for different climatic conditions easier than other breeds. They are both good at sniffing jobs, have the human-aggression component, and possess all necessary traits that are required for MWD. Those attributes make them adaptable to

multiple tasks as single purpose or multi-purpose dogs. The popular shepherd's dogs are the German Shepherds, The Belgian Shepherds, and the Belgian Malinois.

The main differences between these breeds are the physical size, the genetic tendency for illness, and the response capability. The German Shepherds is much bigger than the Belgian one, and much more popular around the world. Different countries use them for police, law enforcement, or searching dogs. The flaw that is starting to reduce their popularity is the hip dysplasia. The illness usually shows up in later life, and causes pain for the dog and leads to a "bunny hopping" movement style. The diagnostic problem means the ending of the military usefulness of the dogs (Lemish 1996, 214).

Belgian Shepherds are smaller ones, but they are intelligent; they have spiritual and physical attributes and courage. Therefore, they are excellent protectors and watchdogs. The Malinois is one kind of the Belgian Shepherd breed. They are smaller than the German Shepherds, but they possess close to all their attributes (Fiorone 2000, 43-44). They are much more resistant to hip dysplasia that affects dogs in several countries. The other advantage of this breed is its quicker response capability. The German Shepherds usually think about what order it got, the Malinois quickly act on what they trained for (Goodavage 2012, 77-78).

However, while the origin of the breed can provide the basic traits or capabilities of the dog it will not guarantee success, and meeting standards all the time. Even though, most of the sources agree the best choice for MWD is the mixed breeds. The reason is obvious; the mixed breed dogs have stronger immunity against diseases, have more stable nervous systems, and have higher intelligence, and adaptability.

The US DOD prefers the Belgian Malinois, but to get bigger and less prone to problem MWDs, they mix the breed with the German Shepherds. The result is a stronger, much more reliable and acceptable breed for any task. The mix breeding does not stop here; they also try to mix them with boxers, pit bulls and other breeds to improve their abilities. In 2009, 115 puppies were whelped in the states showing the US commitment to the Belgian Malinois dogs (Goodavage 2012, 77). The other way to get a mixed breed is the donation method. The British MWD system usually gets dogs from donations within the United Kingdom, and only in rare situations buys them (Thornton 1990, 10). The Hungarian Defense Forces is also familiar with the donation process; it directly adopts from asylum or private families, but the dog cannot be older than two years old. There is no question regarding the economic success and flexibility of the process. If there is one crossed breed in our rearing, we can maintain the bloodline to provide similar abilities for the future.

Selection Process

The origin of the breeds can support the basic selection the MWD program. The different breeds have different numbers of sensor cells in their nose, and the floppy-eared breeds do not have the same active hearing ability as the perk-up ones. Also, the origin of the breed can predict the temperament of the dog. But all dogs must be tested to ensure that their traits fulfill the requirements enter the MWD program.

The selection is the hard part of the MWD program. The requirements are high, and the trainers want to be sure that that animal that gets selected is worth the costs and the time. The desired and judged qualities in the selection methods also include inquisitiveness and adaptability. If the dog shows aggressiveness it is a desired trait for

become a single-purpose dog, but automatically it means refusal to become patrol or scout one. The statistics show that one-tenth of the dogs fail to fulfill the physical and behavioral standards for the selection. The reason is usually fear of the high-altitude places, fear of gunshots, or simply they cannot learn basic tasks (Goodavage 2012, 49). That is why the training process begins with a double number; it is anticipated that half of the dogs will drop out.

However, the Hungarian Defense Forces select and train the dogs for itself; most other armies let this task fall to contractors. One reason is the professionalism of the contractors' services, but the main reason is that they pre-select the dogs, so the army is purchasing only pre-trained and pre-selected dogs that passed the tests. Of course, there is no guarantee that contractor provided dogs fully fulfill the needs for MWD programs, but it provides a good fundamental. Those dogs, who fail in the later training process, become training aids for other dog's training or become adopted civilian dogs for environments or are used for law enforcement agencies (Goodavage 2012, 49). The Hungarian Defense Forces spend four months training a single purpose dog, that finishing with a final exam. The dogs' exam must be repeated each year; if the dog fails, it has 60 days to retake the exam. If the dog fails the annual exam, the dog will be removed from duty status, and hopefully somebody will adopt it.

Limits and considerations overview

In the review of the MWD application in different wars or operations, the results that they provide are subjective. Except for a few instant actions, the pay-back of the dog's presence is preferred much greater by the low-level soldiers rather than the staff or high ranking officers. If you come out successfully from a dangerous situation or simply

survive one, the reasons are always complex how the escalation of the events transpired. Usually we cannot say that one vital factor procedure was the direct silver bullet for avoiding the similar incident in the future.

The MWD application does not offer a silver bullet, or a quick, decisive solution for every problem. But if we understand the limits of the MWDs, we can integrate them easier into the organization, and we can nest their limits for our tactical procedures. The limits based on proper teamwork, proper protection and sustainment, and on the fact that they are sensitive, living creatures.

The first limit is teamwork. The dog with the training and learned skills provides only half of the success, because the handler's role is of equal importance in mutual teamwork. The dogs provide different kinds of alerts for the handler giving awareness about the environment. The dog's response is subjective, that is why the handler must be familiar with the dog's alerts or simply recognize the threat from the dog's behavior. They are working together, to create one team. This fact highlights the common, rigorous preparation and training requirements. Some dogs scent from the ground, others from the air. They provide different displays for alert that need to be recognized (Lemish 1996, 161). Additionally, the handler has the responsibility to read signs in the dog's appearance and demeanor that indicate illnesses, exhaustion, and when the dog is reaching its physical limits.

All these requirements indicate military forces must carefully select military working dog handlers and thoroughly train them. The United States Marine Corps (USMC) IED Detector Dog Operations handbook highlights the handler's role and the selection requirements. The Marines realize that handler selection is vital, and accept

only volunteers. Beyond the standard military requirements and criteria, the USMC prefers dog handlers with prior experience with hunting dogs and with experience with small children, experiences which help the candidate manage the balance of discipline and encouragement (USMC 2012, 6).

Another set of requirements deals with kennels and other accommodations for military working dogs. The quality of these facilities for the dogs significantly influences the quality of the dogs' performance. An appropriately built kennel facilitates the necessary rest for the animal and promotes the health and effectiveness of the dog. In all operating environments, the housing facilities for the dogs must be well ventilated and have noise protection. The kennels should provide protection from extreme weather conditions, including adequate shade, and never have persistent moisture. Military working dogs require similar conditions during transportation, especially protection from overheating, dehydration, or lack of ventilation. The dogs are much more vulnerable to poor conditions than humans (Royal and Taylor 2009, 5-6).

Military working dogs, like soldiers, can suffer from job task overload and job related stress. In operations, dogs have become overwhelmed with tasks, failed to achieve the desired results, and have become sick. According to the dog's health and training level, it falls into one of four readiness or deployability categories. The first category is unrestricted deployability, which means the dog is fully healthy and ready for operational tasks. The second is restricted deployability due to manageable medical conditions that do not significantly limit the dog's performance. The third is temporary non-deployable status that includes those dogs that are under veterinary treatment but have an estimated release date back to their own unit. The last category is non-deployable. These dogs can

perform only limited tasks and be used usually training proficiency only. (DOD MWD 2011, 17)

MWD operations require proper animal healthcare facilities in close proximity. It is the handlers' responsibility to recognize if the dog is hurt or sick and to transport it as soon as possible to the nearest veterinary health service facility for examination. Viruses, infectious and parasitic diseases can cause the death of an animal or can risk service members and other MWDs. To mitigate the risk, the professional animal health care services should provide vaccinations on time but tracking and scheduling vaccinations is a handler responsibility. Military working dogs obviously require proper food in adequate amounts. Dog sustainment includes the proper food issues too. Dogs can be fed from leftover in the kitchen, but not from swill. The correct food is among the primary requirements to keep dogs healthy and mission ready. The logistics structure and handlers must tailor the dogs' diet to the operational environment and mission demands. The dog's weight is the primary factor for calculating the quantity of food the dog needs. For every fifty pounds of the animal's weight, the dog needs a half pound of meat per day. The meat could be horse, beef or chicken, but never spam, raw fish, bacon or canned ham (Lemish 1996, 84-85). The second important component is the vegetables and cereals which balance the meat protein with minerals and vitamins (Royal and Taylor 2009, 5-6)

Also, there are some common human foods that are toxic for dogs such as chocolate, chewing gum, raisins and grapes. Handlers should plan and schedule feeding with feeding occurring at the same time each day. If the dog does not eat all its food within 15 minutes, the handler should take away what remains. If the reason for not

eating all the food is finickiness, this should teach the dog to eat its food when offered. But if the handler suspects illness, he should arrange a veterinary check immediately. Once a week dogs should have a fast day to empty the dog's alimentary canal and to keep a healthy appetite (Horkay 2010, 17).

Dogs also need adequate quantities of water. Dogs do not have sweat glands, most of the heat carried away through convection by panting and panting vaporizes large amounts of water. Without adequate water, the risk of heat injury is extremely high.

Considerations- Equipment

Like soldiers, MWDs need proper equipment to be effective. Environmental conditions pose risks to dogs. Sharp stones or broken glass, the hot desert sand, and insects pose a persistent risk of injury to the animal. They can cause not only physical injuries, but divert the dog's concentration from the task, compromising the search, detection, and warning process. Early Vietnam War experiences showed that when the MWD began to successfully provide early warning against the Vietcong ambushes; the Vietcong counter action was using snipers to locate and shoot the dogs within the patrol formation. The North Vietnamese also used persistent artillery fires to supplement snipers as a counter to U.S. use of dogs. Other relevant lessons came from the Vietnam War and from coalition operations in Afghanistan. The enemy may trigger IEDs as dogs approach the IED location if the enemy "triggerman" believes the dog will find the IED. In Afghanistan as in Vietnam, insurgents' reaction against the successful MWD use included sniper fire to kill or injure the dogs. Because of the deliberate targeting of MWDs, proper body armor for dogs is essential equipment for executing missions using MWDs. Cutting edge body armor for dogs is widely available commercially. As an

example, one firm with the website <http://www.cqbk9.com/handler-equipment/> webpage offers assault K-9 body- armor for a price of one thousand dollars. U.S. Navy SEALs are advocates for MWDs for CIED and also one of the main innovators for equipment and technologies to enhance the dogs' effectiveness and survivability. Among SEAL initiatives are attaching the most modern communications and medical systems to the dog's tactical vest, experimenting using those systems to expand the dog's work capabilities.

Devices to protect MWDs' paws merit specific discussion. Experience shows that if the animal simply steps on a decaying log, even insects annoying the dog can break its focus on its mission tasks (Burnam 2000, 188-189). The same is true if the dog walks on rocks, or coarse grass, hot desert sands or other hazards that could inflict foot injuries. The paw is a vulnerable point of their bodies and small injuries can cause the dog to not be able to work for a long period. Dogs do not like to wear any foot protection, so they try to rip them off. Because of this, MWDs must learn early in their training to wear foot protection without complaint (Lemish 1996, 225).

Limits- Medical and mental considerations

Dogs deployed to the Middle East face extreme terrain and weather conditions. Acclimatization is hard, and without proper specialized equipment, dogs become unable to stay on task. Dust storms, sand and debris from near miss explosions can get in the dog's eyes and cause pain or temporary blindness. The solution, a Dog goggles or the "Doogles," are a simple and cheap, currently about fifteen dollars, counter to the hazards to the dogs' eyes (Ray Allen Manufacturing 2014).

Another hazard involves the dog's breathing and sense of smell. These animals have excellent noses and can provide early warning by smelling the explosives in IEDs. Dogs' sense of smell has definite limits though. In order to sniff, dogs breathe differently, taking about a breath a second. If something disturbs the sniffing rhythms or breathing, the dog can lose its "scent picture" or give false or incorrect signals. Most of the Middle East is very dusty. Dusty environments or, worse, dusty environments with high levels of dust borne pollutants, like those along roads, can harm both the dog's effectiveness and its health (Ritland 2013, 134).

Missions that involve long movements, especially in hot weather like that encountered in the Middle East, can cause the dog to lose interest in its explosive detection task or even to fall victim to heat injury. Dog handlers need to recognize the signs of these problems and use small breaks for cool down and games to regenerate the dog's interest and desire to work. Dogs depend on rapid breathing and panting to cool, and if that is not effective, the dog can start to suffer heat injuries including heat stroke. The first sign of heat stroke is noisy breathing; other signs are change of the color of the dog's tongue and vomiting. If a handler sees these signs, he should cool the dog down as soon as possible using an air-conditioned vehicle or a tub of cold water.

One of the biggest concerns with MWDs is unexpected aggression by the dog in some circumstance. If the dog suffers severe pain or is injured, the risk the dog will reflexively bite increases. The dog and all members of the unit must be familiar with each other prior to the mission starting. Each of the unit members should train how to apply a muzzle to the dog and how to make a field expedient muzzle (Royal and Taylor 2009, 7-8). The handler has the main primary responsibility to control the dog if the MWD is

wounded. However, the handler may suffer wounds from the same event. If the dog bites someone in any circumstances, the wound should be cleaned and examined by a physician as soon as possible. The bite victim should receive a tetanus immunization if there is any doubt that the victim's tetanus shots are up to date. As noted earlier, the handler may also be wounded in the same contact as the dog or the handler hit and the dog not. If the handler is hit, the dog may become even more protective and may bite other friendlies trying to aid the handler. Dogs' loyalty is one of the primary traits that make them so valuable in human eyes. But this loyalty can become dangerous when the dog will not let anybody approach the wounded handler. The dog will guard his wounded friend to ensure that nobody else hurts the handler (Ritland 2013, 167).

The persistent long deployments and multiple combat experiences can cause the same effects on dogs that human experience. PTSD (post-traumatic stress disorder) was officially recognized in 2011. Walter Burghard observed that some dogs which come back from deployment exhibit symptoms similar to PTSD (Goodavage 2012, 230). This highlights that dogs are not so different than the average soldier. Again proper training and preparation and treatment during and post deployment can mitigate these risks. .

Another consistent limitation from USMC experiences is MWDs can become useless family dogs because of overly friendly or inappropriate handling. In past years, units and handlers had a passion for dealing with the dog as a pet. The feelings were natural; they are in the same unit, sharing both experiences and threats. The handlers were sleeping close by their dogs, giving them toys, and treating them like a pet. The problem with that behavior is more than theoretical. MWDs are trained for military jobs. Being treated like a pet causes the MWD to enjoy the non-patrol time rather than patrols

and hard jobs. The dogs lose interest in their work - in this case, finding IEDs – and they become far less of an asset (USMC 2012, 26).

Limits- Religious and Cultural Considerations

With the current operational focus largely on the Muslim world, Islamic cultural considerations introduce some challenges in the employment of MWDs. In Islam, all of God's creatures merit the same respect, but Muslims usually prefer not to have dogs inside their houses. Some Muslims believe that angels will not enter the house where a dog is. Many Muslims believe that dog saliva is impure. Any physical contact with a dog's nose or saliva requires them to wash their clothes and clean any objects the dog touches. They are also afraid of getting infected by tapeworms or other health hazards (USMC 2010, 56). Military forces employing MWDs should respect all these religious concerns both in planning and executing operations. It is necessary to keep in mind that if the MWD wants to sniff somebody, it could be a positive response to the presence of IED materials.

Even with the advantages of MWDs, dogs suffer the same weaknesses as human soldiers. Sometimes a MWD's performance during a deployment might be inconsistent. Handlers should track this and units need to keep records on each dog's performance. If a dog misses an IED or gives an IED alert when no IED is present, finding the reasons for the failures increases the probability of correcting the problem, achieving future mission success and saving lives. Reasons for the dog's failure could be a training problem, issues in the operational environment, or poor handler responses. The different reasons require different solutions or mitigation. The Combat Reporting System supports the evaluation of the problems encountered. The USMC standard system is to track the animals' results

and setup recommendations for future training or even change future deployment status. (USMC 2012, 28-29).

Military Working Dogs as a Component of an Overall Counter IED Approach

Building on the capabilities and limitation of MWDs in the C-IED, analysis will now shift to the role MWDs can play in an overall approach to countering IEDs. Forces most effectively employ MWDs within a well thought-out holistic approach to C-IED efforts and operations.

The main three pillars of the C-IED approaches are: train the forces, attack the network, and defeat the devices. Based on the dogs' capabilities, using military working dogs could be effective in all of these efforts. MWD facilitate attacking the network by finding caches of explosives and alerting on individuals involved in handling explosives. This can assist in breaking the production and distribution chain of IEDs. Finding and defeating the IED makers and the IED factories are the primary tactical level goals of the "attack the network" concept. Targeting requires complex intelligence information analysis and collaboration between the coalition forces in the AO. The possible IED factory can be identified with successful targeting processes, or can be found in search operations, or detected in security support operations. Each of these actions requires a good odor sensor system to track and isolate the suspected objects and persons on the spot.

Successful targeting will be followed by direct action to defeat the IED factory or the maker. Either the object or the person usually has obvious physical signs that show the connection with the homemade explosive components such as nitric acid odor, large

pots, propane tanks, and yellow stains on the skin or clothing, etc. All those signs can be covered or camouflaged, but odor cannot be masked. The dog can smell the different component odor from one main odor. It does not matter how the opponent forces try to mask or modify the odor, the dog can divide the individual components and alert to for the threat odor (Ritland 2013, 143). On foot patrols, the MWD can sniff out all persons connected with explosives or IED preparation chemical components. This skill provides tactical advantages not only in searching or security support operations but in direct actions to isolate IED factories.

The second pillar is defeat the device. That effort includes actions, reactions and counteractions on the tactical level. Defeating the device has three main components, these are: defending fixed installations, defending moving vehicles and soldiers and neutralizing the IEDs. Suicide attacks using vehicle or personnel borne IEDs is the primary IED threat against fixed installations such as camps, bases or other garrisons. The procedures for defending fixed installations are not new. They include establishing fortified outer search zones, standoff areas, and security measures provide the defeating or mitigating the IED threat against fixed assets. There are different ways attackers can avoid or defeat these security measures and enhance an IED's effect by penetrating deep into the target. Most relevant to the CIED potential of Military Working Dogs is countering hidden and covered IEDs and preventing them from entering a fixed installation or approaching close enough to cause significant damage. To prevent IEDs from approaching or entering the site, guards must check incoming pedestrian and vehicle traffic before it arrives too close to the installation. Military Working Dogs trained for explosive detection excel at this task. Currently Hungarian Defense Forces

Explosive Ordnance Disposal (EOD) team military working dogs are performing this task in Afghanistan.

Countering IED attacks against mobile or moving objects involves either soldiers on foot or vehicles and includes IED sweep operations. These operations ultimately all become operations on foot. Obviously, foot patrols start on foot. But vehicles, even with cutting edge reactive armor and electronic jammers, stop and send IED search and clearing teams out on foot once there is evidence of an IED along the route. Foot or dismounted sweeps have the task of real-time location and identification of IEDs in choke points, and other suspicious areas. In the realm of defeating the devices, dogs can find emplaced devices and sometimes the triggermen, prior to detonation of the devices. As living sensors, dogs can sweep suspicious terrain or choke point checking.

Additionally they can find small arms ambushes as a by-product of searching for IEDs

Once the dismounted sweep finds an IED, it sets-up conditions for EOD unit to come and neutralize that (USMC 2012, 23). MWDs can be very effective in these sweeps if they and the units they operate in receive good training and preparation. Intelligence provides current available information about the insurgent's tactics, techniques, and procedures and details on the enemy's type of IEDs including the type of explosive these IEDs contain. Intelligence information also provides information on other hazards relevant to MWDs such as broken glass, the presence of other animals, and unfavorable weather (USMC 2010, 15). All this information supports the MWD handler and the unit in planning and rehearsing for the mission.

During these sweeps on foot, the handler should follow the dog and observe the dog's behavior to identify the strong or hard alert. Afghanistan experience shows the

dogs, however, must be capable of operating without being on a leash. In one tragic incident, Air Force TSgt Leonard Anderson was seriously injured by a remote-controlled IED when he participated with his MWD in a foot patrol and the dog did not have off-leash capability. The enemy triggered the IED when TSgt Anderson approached the IED but before the dog had the chance to discover and alert on it. Nothing can guarantee that a dog will find all IEDs if working off-leash, but the distance between the dog and handler can reduce the risk to the handler (Babbitt 2013, 10). The off-leash capability requires increased training. Even during the Vietnam War, only a few dogs had off leash capability. During the off-leash application, the dog is more vulnerable to enemy fires and counter actions. In off leash mode, it is much harder to control and navigate the dog's movement, and from longer distances, it is more difficult to read the dog's signals.

One of the reasons most dogs in the Vietnam War were employed on a leash was to have physical control of the dog and to limit his aggression. When trained scout dogs detected the enemy's odor, even though the dog was trained for silent signals, the dog often felt a drive to move closer toward the enemy. The success of counter ambush actions depend on surprise and surprise requires the dog remaining close to the handler and not closing with the enemy. The MWD should work together with the patrol as an integrated early warning sensor. Wind direction is also important. If the wind is blowing from the enemy's anticipated position, the handler and the MWD should be in the point position. If the wind is opposite, they should be in the middle or the rear of the patrol formation (Lemish 1996, 156). When the patrol is checking a choke point or a suspicious area, the patrol leader should direct the MWD handler and the portion of the patrol securing them forward and move according to the wind direction. They should move with

the wind in their face in order to give the opportunity for the dog to get as much odor as possible. Off leash, these movements require intense coordination between the dog, the handler, and the rest of the patrol. The optimum distance between the handler and the dog depends on the terrain and the task, but it should not be further than the visual contact distance. This guarantees the handler can read the dog's signals and the patrol can cover the dog by fire if necessary. There are different ways of preparing MWDs for off-leash work. In the Vietnam War, the handlers used clucking sounds to get the dog's attention if the distance was getting too great (Lemish 1996, 156). Nowadays, one of the Navy SEAL members trained his dog to follow a laser pointer red dot. Where the laser pointer beam appeared, the dog went to it and checked the area. Though there are limitations to this method, it has practical advantages (Ritland 2013, 106).

Another method that the Navy SEALs tried involved radio controlled off-leash capability. The tactical vest for the MWDs provides not only protection against small arms fire for the dog, but also an integrated microphone and speaker system. The handler stays a distance behind the dog and observes the dog's movements and signals, using the radio to give commands to the dog (Chu 2014). In the current operating environment, on-leash movement should be only for administrative moves. In all tactical operations, MWDs with C-IED tasks should be off leash.

The third main component of the effort to defeating the device is neutralizing the IED once found. The Hungarian Defense Forces EOD teams focus on this task. The dogs find and confirm the explosives in different, usually complicated environments and then EOD teams neutralize the IED.

Mine Dog and the resulting problem

MWDs can be effective as part in all three pillars of C-IED efforts. The possible solutions and ways we prepare dogs for what they are used is limited only by our imaginations. Critical lessons learned from the past can give us help finding out-of-the-box solutions, with the caution that the lessons learned from previous missions always have a context and that enemies also read and adjust based on lessons learned. The mine detecting dog program (called M-DOGS) was a military working dog program during World War II. Experiences from M-DOGS provided vital lessons for the future. The program was ineffective due to lack of a comprehensive understanding and due to failures in training. Many professionals believe that IED detection represents an improved version of the use of dogs for countering landmines. Though this statement is controversial, there are similarities between M-DOGS and current thinking on the use of MWDs for C-IED. M-DOGS main concept was to use dogs to detect buried nonmetallic mines that mine detecting devices based on metal detectors could not find. Although the dogs missed only twenty percent of the mines during the training period; the results in the field were much worse. The reason for this poor result was improperly simulating the operational environment. While the training, trainers ensured the environment was calm and quiet. There were no small arms fire or artillery explosions, and there were no dead or wound soldiers on the training field (Lemish 1996, 96-97). Encountering those real world distractions in combat was too much for the dogs and they became ineffective. Armies often want immediate pay-back with solid results. Due to lack of understanding of dog behavior and inadequate replication of combat conditions during training, M-DOGS provided neither.

Current developments other possible solutions

IED tactics, techniques and procedures are constantly evolving. C-IED, by necessity, is always “playing catch-up ball.” Dealing with the fact that the users of IEDs always have the initiative is a challenge to the counterinsurgent.

Even though acquiring new technology has improved the capabilities and survivability of Hungarian EOD teams, there still is not a comprehensive solution to the IED threat Hungarian troops face. The need for an effective and comprehensive C-IED approach for the Hungarian Forces deserves more and better analysis. The complex IED problem requires complex systems and integrated solutions. MWDs have the potential to be the centerpiece of an effective and comprehensive Hungarian Defense Force C-IED approach. MWDs, however, are not a stand-alone solution. There are other components of an effective and comprehensive C-IED approach that need continued attention from both Hungarian Forces and our partners:

1. Improved and more sophisticated training and education
2. Improving all forms of C-IED reconnaissance and detection capabilities
3. Strong and more long range signal blocking capabilities
4. Improved protection and survivability
5. More dedicated assets to find and neutralize IEDs; some assets for reacting to suspicious threats.

The first key answer for the IED threat is improved and more sophisticated training and education. Training and education must be continual and take place before the deployment. Multinational C-IED exchanges and training course can facilitate exchanging knowledge and improving all partners’ C-IED effectiveness. A shared

coalition database on IED attacks and lessons learned is also valuable. Even on its own, Hungary has most of the necessary courses and there is continual study and innovation in the C-IED field. This requires constant effort and a view toward future IED threats, not just those of the past.

Improving all forms of C-IED reconnaissance and detection capabilities is the second-development line of effort. This includes ground robot technologies, air assets, and different kinds of handheld detecting devices. Robot technology innovation has exploded in last few decades. From the simple mini reconnaissance robots to the heavy EOD robots, everything is available in the market. The only question “what is our requirement?”

Simple, small size reconnaissance robots can provide live audio and video feeds for the operator. These are short range, limited endurance tools. One example is the *Throwbot XT* tactical robot system. This water and dust resistant unit’s weight is only 1.2 lbs with a titanium shell, and its small size means it can be thrown by an operator (with a good arm) up to 36 meter (Recon Robotics 2014a). The communications range can be up to 91 meters. The operating time is about 1-2 hours, depending on the exact platform. The tool is available on the Internet and it has passed its first set of evaluations by the US Military. Prices start from \$ 7500 and go up to \$ 24,000 dollars depending on what kind of platform, capabilities and maintenance tools are included (Recon Robotics 2014b).

Though the robot has some sustainment and maintenance costs, the purchasing price and up-keep cost are still low enough for the robot to be an acceptable long-term investment. Its relatively low cost, the off-the-shelf availability, and its portability and ease of use make it a valuable tool for C-IED. Its limitations are operational range, the

maintenance requirements, and the narrow range of IED discovery capability. The robot provides the operator an images what it sees, and the operator can navigate it close to a threat without putting himself in any danger. Once thrown, it has a ground mobility capability to allow it negotiate many obstacles. There are also potential upgrades to the optics packages. The robot system cannot, however, detect or neutralize buried or extremely well camouflaged IEDs.

Another family of small surveillance systems is micro drone technologies. As with the small ground robot systems, airborne robot systems (UAVs) are also available on the commercial off-the-shelf market. One of the preferred systems is the MI MD4-1000 UAV. This robot has four rotary wings and can operate up to 88 minutes with a 40 kilometer range. The system can fly autonomously using GPS or can be controlled manually. It can provide live pictures for a real-time surveillance capability. An area can be scanned and - choke points and IED triggermen easily identified from high altitude using advanced electro-optical systems. This drone has a 1200 gram payload so it may also have many other uses (Microdrones GMBH 2014).

The third main technology development effort is jamming systems. Jamming technology, also termed Electronic Counter Measures (ECM), is against radio-initiated IEDs. This technology is already in use in Afghanistan for convoy security and fixed installations protection. In Afghanistan, the jammers for convoy protection are installed in the vehicles and they provide a short range “jamming radius” around the vehicle. The exact distance cannot be defined due to variables such as enemy IED transmitter power and, distance between transmitter and receiver. This means, dismounted patrols must stay relatively close to the vehicle carrying the jammer to be protected by it. Man-pack

jammers can bridge this gap and provide jamming capabilities for dismounted patrols.

The VIP650-man pack jammer is a standard backpack radio size tool designed for rugged terrain environments.

The improved protection effort also includes everything that increases survivability. Soldiers' body armor can be upgraded by pelvic undergarments that provide extra protection to the femoral/colon arteries. Vehicles can also be equipped with a mine roller running in the front of the vehicle, causing early detonation reducing the casualties from pressure detonated IEDs.

The fourth-development effort focuses on capabilities tailor-made for specific situations. Examples are MINEHOUND man-portable metal detector that can detect buried explosives with low or non-metallic components. Some other capabilities provide freedom of movement and neutralization of buried IEDs. The Tactical Charge Clearance System has two variations. One kind is throwable, the other is rocket launched. Both systems are compact, man-portable, and designed to neutralize, expose or disable IED triggers. Even though the EOD members do not prefer these tools because of the damage to those IEDs that the line charge does not detonate makes the damaged IEDs harder to defuse, the system still has value in some applications. Forces need to integrate each new development or system in their overall C-IED approach in order for the innovation to result in overall increased C-IED effectiveness. All these improve a capability that needs to be integrated and adapted with a comprehensive concept. Even though this study focuses on C-IED employment of dogs, effective, integrated C-IED approaches include both MWD and all these other tools used synergistically.

DOTML-PF

Using the available sources, assumptions and my personal judgments, the method lead through the concept to finalize the conclusion and set up the basis of the recommendations in chapter 5.

Doctrine

In accordance with the analysis, my judgment on the military working dog concept is the single purpose dogs. However, the Navy seal multi-purpose dogs are desired ones, I prefer the British model of one dog for one job. The reason is the costs and the selection issues. The Navy seal spends millions for the correct selection, persistent training and new capability buildings. Even though the results are enviable, the Hungarian Defense Forces requirements are different. All the capability that the dogs can provide is necessary, but for budget concerns, the ability should be separated. It means, the HDF should not look for one dog type for the C-IED strategy, rather than more kind of dogs' simultaneous application can guarantee the desired ways.

Using the analysis results and my personal judgment, my recommendations is the simultaneous complex use of explosive detector dogs and combat tracker dogs in the same tactical unit. The reason is using the tracker as early warning capability and the special explosive find capability that together bridges the possible gaps and mitigates the opponent forces' chances. The concept should be based on the tracker dog early warning capability to identify the threat, and the explosive searching dog's ability to find and confirm it. Supporting the explosive searching dog task after the threat signal is shown, the combat tracker dog focuses on the outer ring to ensure there is no secondary IED, triggerman or prepared small arms ambush around the area. If the tactical unit leader has

other intelligence systems, he can use both dogs to get double affirmation about the exact location of the devices or threats. MWD program is a good fundamental or center idea as a C-IED strategy concept, but not enough by itself. The current situation and threats require technical support to improve or protect the MWDs during the tasks. My recommendation that is to improve the dog protection against radio controlled IEDs, the man pack jammer and one field reconnaissance tool should be attached. During the tasks, before the MWD team gets closer to the threat, the jamming environment must be provided, and the intelligence tools should make a quick overview of the area searching for a triggerman or any suspicious sign around the working area (figure 6).

If those circumstance conditions are set up, the military working dog can start its purpose on wind direction with off-leash mode. Following this process, the MWD program development requires a current and useful doctrine. The MWD application should be a standard process to ensure that all level commanders can read and understand the concept and the way of using military working dogs on mission. The doctrine supports the handlers to understand the requirements, and build up their own training concepts providing the appropriate results and quick responses in all circumstances. Vital to keep in mind is that each action is followed by reaction. It means, if the tactic is effective against the IEDs, the insurgents start seeking the weakness or set up new threats to mitigate our success and seize the initiative back from us. My recommendation is to prepare the doctrine in digital version, and keep refresh online, if the insurgents' reaction is identified, the counter-action measures can integrate back to the doctrine.

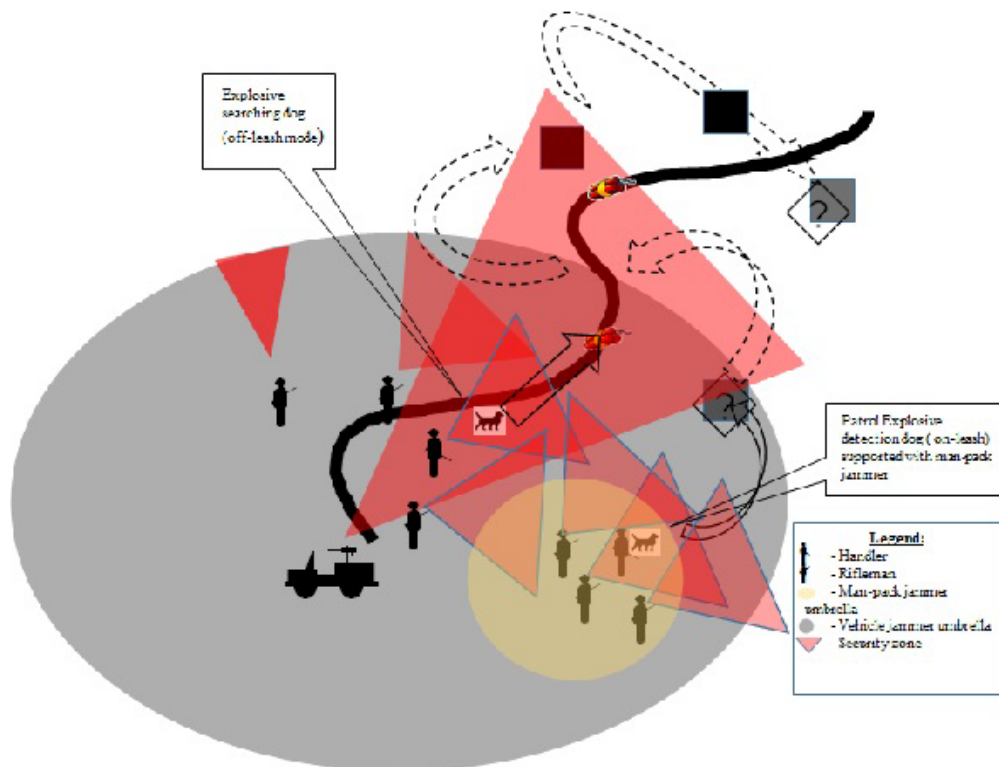


Figure 6. Tactical Draft

Source: Created by author.

Organization

The desired numbers of the Hungarian MWDs are limited by the fighting unit numbers. The Hungarian Defense Forces structure consists of two brigades that include eight deployable battalions. These battalions are deployed in a rotation system for different missions, sometimes in cooperation with each other, but sometimes separately. Concerning the MWD's health and readiness status not all animals are always ready-to-use. Unseen illnesses and physical or training problems can affect how many can be deployed. Keeping up the combat readiness status, the brigades need three categories

assigned groups of MWDs. The first category is the deployed one, the second is the temporary non-deployed and under personal training group, and the third one is the combined integrated training and home defense response group (figure 7). Based on current deployment activities and experiences, the deployed battalion share its effort for different tasks to maintain and execute the mission. It means not all groups or all company require MWD support at the same time. It would be easy to recommend the distribution of MWDs for all companies, but this creates sustainment and cost effective issues. If the company level MWDs requisition is not full time task oriented, the budget decision makers many question why we keep them if we use only a portion in deployments. My judgment is that the deployed battalion can support troops using four MWD teams. Each team consists of one explosive searching dog and one combat tracker dog with their own handlers. However, all deployments are different, but generally we can say that one MWD team responsibility is the base support operations, two assigned for field jobs, and one stays in reserve or is assigned for quick reaction force. While this is only a concept, and all force management issues depend on the task, the current threat level, and the commander decisions, the current model should offer a viable solution.

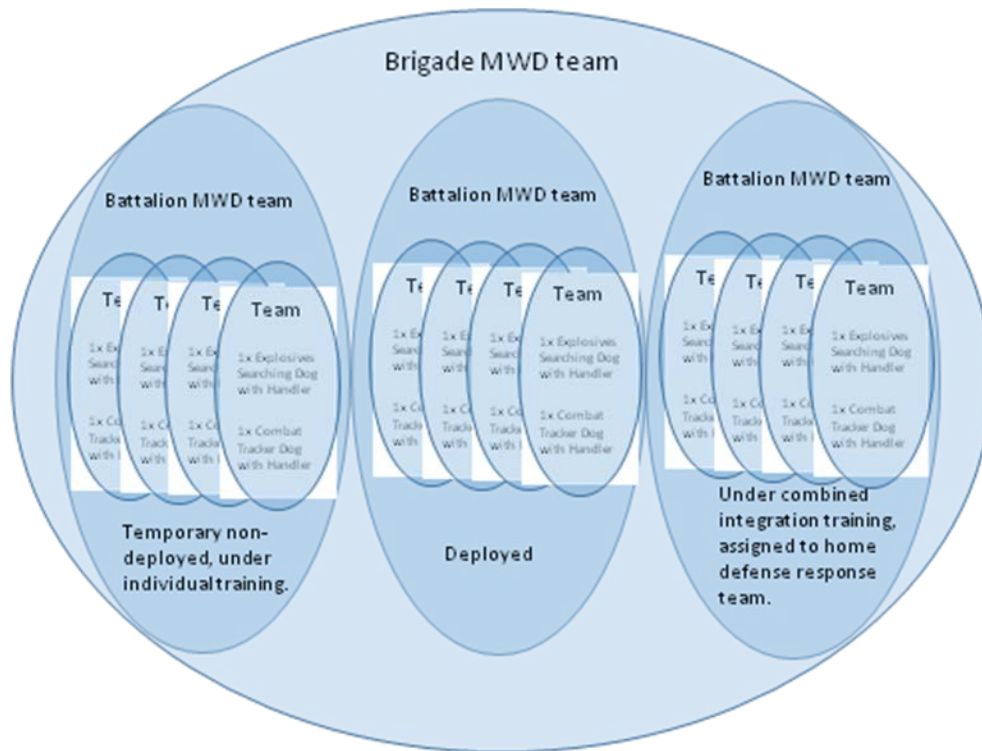


Figure 7. Brigade MWD Teams

Source: Created by author.

Training

The current military working dogs experiences in Hungarian Defense Forces have not been ignored. The EOD units currently have fourteen explosive searching dogs, and have four undergoing training. It means that the units have experience with explosive searching dogs' training and applications. Because the explosive searching dogs need qualification and refresher training in every year, their skill is vital for the Hungarian Defense Force level MWD program. However, since currently these teams do not have combat tracker dog training capability, the recommendation includes providing this training for the assigned EOD members by contractor first. After wards they will able

provide the capability to maintain and share that ability for the battalion teams. The EOD organization's responsibility should be organizing and executing the annual training and qualifications for all explosive searching dogs. The training could be organized in the EOD unit garrison for all available dogs and handlers with temporary replacement, or the EOD assigned members as a mobile training team visit to the battalions one-by-one.

The MWD analysis highlighted the necessity of the off-leash application. The conclusion is that the off-leash capability is vital for most kinds of MWD jobs. The on-leash mode should be only administrative movement, or temporary movement control for the dogs, but in the field or during the application the dog should work maximum 70 meters away from the handler. The proper training requires the dogs respond not only to provide hard signals for the handler only, but in emergency or in contact the ability to react and follow the handler orders.

Materiel

Running through the analysis and the lesson learned experiences the breed selection includes two recommendations. The Belgian Malinois is one of the best breeds for Military Working Dogs. The ability, the response and reaction time, the intelligence and the reduced genetic tendency for illness support that idea. Even the breed is not a guarantee for success per se; the general ability and traits from the breed provide good fundamentals. Checking the internet sources, The Hungarian kennels sell Belgian Malinois for two hundred dollars (Netdogs 2014). Even the puppies' need a pre-selection ensuring that they possess all the traits that need to become an MWD; hence, the cost is acceptable. The second breed concept is the mixed breeds, because of the intelligence, the stronger immunity and adaptability, and a fact that cannot be ignored is that it is the

cheapest acquisition. The Hungarian asylums are filled with un-owned mixed dogs, which are waiting for to be adopted or, in the worst scenario, for euthanasia. The recommendation is a prepared acquisition process with pre-selection using these asylums. The pre-selection process does not focus only on the traits, but limits the ages to two years. The reason is the dog personality and training adaptability that requires younger dogs. The analysis highlights why the proper equipment is relevant to execute the mission in different conditions. The conclusion is that the dog's eye protection, foot protection and body armor are the primary tools that are recommended to get in the early period. The analysis proved if dog accustoming for those tools is missed in the early period, the dog would not tolerate wearing that equipment. The lesson learned experiences led over through analysis how a simple equipment absence could take away the dog's focus from the task, and cause inefficiency.

Leadership and education

The education domain focuses on sharing and understanding the limits and appropriate applications of the MWD teams. This method focuses on the planning process in the AO, and the possible effectiveness calculation for the future. If the commanders understand that the result and the effectiveness are not persistent and measurable, they will accept the risks and can take efforts to mitigate that. The doctrine knowledge and the appropriate documentation and statistics provide feedback to improve and adapt the experiences and suggestions, and make the MWD concept a reality.

Personnel

Whereas all sources used in the analysis agreed that MWDs are useless without appropriate handler and vice versa, fewer sources set up conditions for the handler selection. One of the exceptions is the Marine Corps' experience and handler selection requirements that could serve as an example for the Hungarian Defense Forces avoiding future failures or misunderstandings. In accordance with the Marine Corps requirements, the final conclusion about the appropriate selection method in the Hungarian Defense Forces is supposed to be based on volunteering. The preferred categories are the commissioned personnel. This is based on two fundamental assumptions about the Hungarian Defense Forces system. First, the contractual soldiers signed only two years employment, and after two years they have the right to stay or leave, if their commander is satisfied with their results. The second is the sense of responsibility; working and living together with an MWD requires balanced decisions and responsibilities in all circumstances. Usually the non-commissioned officers (NCO), who have already lead small tactical units, have a higher sense of responsibility than the young enlisted ones. However, the selection door remains open for enlisted soldiers, but they much more prefer NCOs.

The recommendation for the handler selection is not only focus on rank, physical and mental stability, but giving advantage to those persons, who have pre-experiences with hunting dogs and children. This idea came from the Marine Corps, and seems highly adaptable.

Facilities

The MWD program set up begins with the conditions of the buildings. The designated units' bases must build a proper kennel on-post preparing the accommodation for the dogs. The previous chapter dealt with the kennel requirements, but it should not cause too many difficulties for the units, because in the previous decades, the Hungarian military garrisons used to have guarding dogs and kennels. The recommendation is only to renew those kennels, or if they are destroyed, the building plans are still available in the unit layout library, that they can reproduce. The other recommendation is the training facility building in each designated unit base. To maintain the trained capabilities, the MWD require periodic training, as well as annual qualification. The training facility can be an abandoned building complex, or a part of the unit training field. The different obstacles and prepared training field support the off-leash capability training, and set up hard conditions and situations for the dog to learn how keep contact with his handler in any kind of event. The dogs' physical conditions do not depend on for the proper equipment only, but require persistent veterinary overview. Important to understand is that in a small army such as the Hungarian Defense Forces, generating a new position for veterinary service is not desired and not economic. During the home station period, the nearest city civilian veterinary clinic should provide the support by contract. On deployment, in the preparation phases it should analyze how this support can be provided. If some other coalition partner has the capability, the mutual support or acquisition and cross-servicing agreements can be a solution. If the coalition partner's support is not available, the host nation support and contracts could be the other way.

Conclusion

The military working dog is a useful and emerging concept all around the world. The process is not new, simply a refreshed and revised idea how the dog can support the C-IED tasks, and give much more on trust and sense that the machine cannot. Currently, the Hungarian C-IED efforts focus on the EOD units' capability and protection improvements. Although these units are facing directly the threat when they refuse it—in light of the wakeup call from the IED threat that cost two Hungarian EOD team members' lives—the direct EOD developments will not protect the tactical units' survivability on the field. The Hungarian Defense Forces (HDF) does not have C-IED doctrine or updated concept. This does not mean that the HDF ignores or does not show interest in threat mitigation. As a coalition member, the lesson learned experiences and the mutual joint level concepts are integrated, and we are committed to take part in the mutual effort in the IED fight. Even though, trainings and coalition building is highly likely, the technical and probably the MWD development cannot be postponed. Maintain the home defense capability, and support our deployed troops IED protection ability, it requires decision and investment for the present and for the future. Usually, the technical developments are much higher investments, and focus on only one problem. The MWD is cheaper, and can add or change tactics, revise the training efforts and build new capabilities. The dogs are a long-term solution not only for the C-IED fight; but until the moment that we send boots on the ground, the MWDs provide vital sensors and faithful friends in the battlefield. The main difference between the technological systems and the dogs is that the dogs can provide mutual trust between the soldiers and them, and it's a long term capability building without update problems. The technical developments carry

on persistent issues, the acquisition, the distribution and the deployments include considerable expenditure, and the continuous sustainment and maintenance just increases the costs. By the way, sometimes these developments provide a limited capability or temporary solution for a problem. One good example is the Mine Resistant Ambush Protected Vehicle (MRAP family), that improves troop protection in Afghanistan, but the technical parameters and the sustainment concerns make it unusable in conventional warfare. For a small country with limited budget, the selected innovation direction should provide multiple advantages, and long term solutions. That the military working dogs can provide. The clever preparation and integration will give not only a C-IED capability, rather than a four foot living sensor, that can be trained for different applications, and provide new ability for the tactical units. The following chapter offers the final conclusions and recommendations.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This study seeks to answer the primary research question, should the Hungarian Defense Forces prepare their counter improvised explosive device strategy and capability for effective participation in the future NATO operations while constrained by a limited budget? The current battlefields and low-intensity conflicts highlight the necessity of C-IED efforts. None of the world's nation can ignore the C-IED need for strategies and capabilities. The developed tactics and new devices have created strategy impacts and effect but a cheap solution at tactical level has improved the predecessor mines concepts. The advanced battlefields, engagements and increasing losses' rates are dictating the rapid acquisition and distribution efforts; new systems and technologies come and go in the desperate C-IED fight. All nations have already faced wake-up calls against the threat. They are considering developing an idea through to a vision expanding the defense capabilities against the threat not only on deployment, but to guarantee national state sovereignty also.

However, with Afghanistan operations coming to an end and phase five redeployment efforts, one can see at the light at the end of the tunnel. But history always reminds us that all nations fight the previous war in the followed ones. International- and extremist lead conflicts are expanding all over the world and predict possible wars, battlefields and homeland threats for the close future of the twenty-first century. This concept guarantees that IEDs will not disappear, and the future application of the tool will be improved as the C-IED fight will never end.

Hungarian Defense Force is not an exception for all of these issues. The active participation in multinational operations, and commitment in NATO missions, helps for adapting and integrating advanced systems, visions and doctrine for better cooperation, and provides the necessary development for increasing the HDF capabilities. The IED threat does not belong to only Afghanistan or Iraq; IED is the key threat in most of the low-intensity conflicts and unconventional warfare, but the effectiveness of the weapon predicts possible applications in conventional warfare also.

It is vital to maintain the Hungarian soldiers' commitment in the multinational operations and increase survivability against the IED threat. These tasks support building home defense capability and improving the prevention of the possible terrorist attacks in our nation. There is no question about the requirements of the C-IED fight, but the decreased defense budget result in hard conditions for the decision makers between the concepts. The several shortfalls and lack of capabilities are not excuses for the future. The C-IED strategy requires one main concept as a center core for capability building. The new, improved efforts always require investments, money transfers, savings and regrouping from one project to the other. Whatever the decision for the future is, it should to provide long-term, sustainable, feasible, and acceptable solutions for the HDF. As a small country with a limited budget, the selected innovation direction should offer multiple advantages and long term solution that the military working dogs can provide.

Summary of Interpretation of Findings

The previous chapters gave a comprehensive overview of the MWDs history, and provided an analysis in order to identify the possible gaps and problems with using MWDs, and presented some technical solutions to mitigate that. The previous and current

wars' lesson learned experiences provide support to create strategies for future developments and help avoid the same mistakes that other nations have made. The importance of dogs through all war since World War I has not changed. Some nations including Hungary, do not provide a vital necessity of possessing MWD for multiple tasks yet. Even the vision and the concept of using MWDs seems out of time, the opponent forces simple but tricky mind require old fashion and reliable counter effort on all fronts.

However, the MWD concept is always controversial. The lack of the success usually, stems from conceptual misunderstanding or ignoring MWD limits inappropriate training. The assigned tasks identify which MWD category provides the desired results. The different breeds share diversified traits that make the selection part for the MWD categories hard. One should keep in mind that a MWD program is a good fundamental or center idea as a C-IED strategy concept, but not enough by itself. It is supposed to be integrated with the unit and should be supported with other systems to ensure success.

The thesis highlighted that the MWD concept is a global system that depends on the dog, the handler and the application concept together. All parts are vital, and none of them can be ignored. Understanding the limits, the past causes and effects help to improve the doctrine, and accept or deal with the risk of the MWDs. The comprehensive picture through the thesis can convince all level Hungarian soldiers to buy-in to the concept providing the commitments for the positive feedback of the possible development.

Recommendations for the Hungarian Defense Forces

The comprehensive analysis highlighted the necessary decisions and equipment for building up a new capability that can provide early warning and indirectly troop protection in several situations. The C-IED fight is a wide range effort that requires multiple developments, but as a vision, one center core idea is supposed to provide the main concept for strategy building. The tactical level integrated MWD application in multiple operations is the acceptable milestone for all lines of operation in the C-IED as attack the network, defeat the device and train the force. The MWD integration expands the list of the required assets providing success, but the basic or primary element is the dog per se.

The trained dog and appropriately selected handler together as a team offers the capability for the long term. The MWD service time is subjective, depends on the health and mental conditions, but without any serious event, the dog can stay in service up to seven years. Training, selection and application compose the life cycle model that ensures the long-term solution for the HDF.

The DOTML-PF domains help understanding and identify the challenges and the requirements for the future avoiding the sunk cost or cognitive biases issues. The suggestion for the HDF starts with the pre-selection and pre-training process and builds up the program starting with limited MWD teams. The civilian dog trainers, Hungarian breeds, and Hungarian asylums are the primary line of effort to get closer to the desired end-state. The contracts and registrations help to get comprehensive pictures about the dog's current status all over Hungary. The civilian dog trainer can make the pre-selection and pre-training for the MWD program. The pilot dogs are supposed to be a few Belgian

Malinois and pre-selected mixed breeds. Simultaneously, the Hungarian EOD team dog trainer personnel get trained for the off-leash mode trainings and the combat tracker dog training skills. The assigned units rebuild or renovate the kennels on the garrisons, and call for volunteers to become handlers. The suggestion is to set up only one dog team per battalion for pilot reasons and identify the follow-on issues and challenges. The feedback from the tactical units during the training helps to refine the concept and the requirements for the future.

The integrated pilot MWD teams get equipped with all the dog protection assets, with one man portable jammer and one technical recon assets (as UAV or throwback) understanding and improving the global system concept. Even if the MWD program gets cut, the technical investments are still useful for supporting the battalions' basic tasks as well.

It is essential to understand that a small cost saving in equipment or training ignorance can lead the failure of all concepts. However, while the primary investment is higher, the adapted and integrated tools can provide a long term concept. The sustainment cost of the technical recon assets and the men portable jammer is unknown, but the lack of acquisition is no excuse. The primary unsatisfied result can happen, but the program needs to synchronize and improve and not to drop. All DOTML-PF domains have different obstacles and challenges to set up a new concept for the HDF, but maybe the hardest domain of all will be leadership. The way to change the cognitive biases, the way of thinking and adapt the new concept requires buy-in commitment at all levels.

Recommendations for Future Research

While, the previous chapter's analysis helps to understand the competition, problems and challenges through the DOTML-PF domains, a lot of questions are still open and require follow-on research. The MWD program relies on appropriate training. Hence, the individual dog training and the handler training require research for the future to avoid primary failure. Moreover, the MWD program seems a long-term cost effective solution, even though the required support technical systems acquisition and sustainment costs for long term has not been checked. The maintenance and eventual repairs include different costs and mutual support or acquisition and cross-servicing agreements with the manufactures or nations and requires further exploration

Conclusion

The sense of urgency for improving the C-IED strategy no longer requires a wakeup call; the threat and the losses already proved the necessity of the follow-on steps. However, the budget constraints are getting worse in every fiscal year and the delayed initiation will be much more painful on a long-term period. MWDs can provide what the machine and the new shiny tools cannot; they are partners, comrades and reliable field sensors together. However, while the measures of effects are subjective, possessing MWDs in a tactical unit is always an advantage. If the combat commanders accept the limits and capability constraints of using MWDs, the prudent risk can be mitigated, and unit protection and thus the operation success can be improved.

Technology, like the electronic frequency jammers used in Iraq to prevent bombs from being detonated by cell phones or TV remotes, has been successful, but the highest detection rates were still achieved using K-9 units and trained handlers.

— LTG Michael L. Oates

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